

NOV 07 2000

TECH CENTER 1000/2900

SEQUENCE LISTING



<100> BRILES et al.

<120> PNEUMOCOCCAL SURFACE PROTEIN C (PSPC), EPITOPIC REGIONS
AND STRAINS THEREOF AND USES THEREFOR

<130> 454312-3140

<140> 09/298,523

<141> 1999-04-23

<160> 78

<170> PatentIn Ver. 2.1

<210> 1

<211> 691

<212> PRT

<213> Streptococcus pneumoniae

<400> 1

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35 40 45

Thr Ser Ser Gly Gln Asp Ile Ser Lys Lys Tyr Ala Asp Glu Val Glu
50 55 60

Ser His Leu Glu Ser Ile Leu Lys Asp Val Lys Lys Asn Leu Lys Lys
65 70 75 80

Val Gln His Thr Gln Asn Val Gly Leu Ile Thr Lys Leu Ser Glu Ile
85 90 95

Lys Lys Lys Tyr Leu Tyr Asp Leu Lys Val Asn Val Leu Ser Glu Ala
100 105 110

Glu Leu Thr Ser Lys Thr Lys Glu Thr Lys Glu Lys Leu Thr Ala Thr
115 120 125

Phe Glu Gln Phe Lys Lys Asp Thr Leu Pro Thr Glu Pro Glu Lys Lys
130 135 140

Val Ala Glu Ala Gln Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu
 145 150 155 160
 Asp Gln Lys Glu Lys Asp Arg Arg Asn Tyr Pro Thr Ile Thr Tyr Lys
 165 170 175
 Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Glu Val Lys Lys Ala
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 Glu Leu Glu Leu Val Lys Val Lys Ala Lys Glu Ser Gln Asp Glu Glu
 195 200 205
 Lys Ile Lys Gln Ala Glu Ala Glu Val Glu Ser Lys Gln Ala Glu Ala
 210 215 220
 Thr Arg Leu Lys Lys Ile Lys Thr Asp Arg Glu Glu Ala Lys Arg Lys
 225 230 235 240
 Ala Asp Ala Lys Leu Lys Glu Ala Val Glu Lys Asn Val Ala Thr Ser
 245 250 255
 Glu Gln Asp Lys Pro Lys Arg Arg Ala Lys Arg Gly Val Ser Gly Glu
 260 265 270
 Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser
 275 280 285
 Ser Val Gly Glu Glu Thr Leu Pro Ser Pro Ser Leu Asn Met Ala Asn
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 Glu Ser Gln Thr Glu His Arg Lys Asp Val Asp Glu Tyr Ile Lys Lys
 305 310 315 320
 Met Leu Ser Glu Ile Gln Leu Asp Arg Arg Lys His Thr Gln Asn Val
 325 330 335
 Asn Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu
 340 345 350
 Leu Ser Val Leu Lys Glu Asn Ser Lys Lys Glu Glu Leu Thr Ser Lys
 355 360 365
 Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe Lys Lys Asp Thr
 370 375 380
 Leu Lys Pro Glu Lys Lys Val Ala Glu Ala Glu Lys Lys Val Glu Glu
 385 390 395 400

Ala Lys Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr	405	410	415
Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp	420	425	430
Val Lys Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Asn	435	440	445
Glu Ser Arg Asn Glu Glu Lys Ile Lys Gln Ala Lys Glu Lys Val Glu	450	455	460
Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg	465	470	475
Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys Ala Glu Glu Ser Glu Lys	485	490	495
Lys Ala Ala Glu Ala Lys Gln Lys Val Asp Ala Glu Glu Tyr Ala Leu	500	505	510
Glu Ala Lys Ile Ala Glu Leu Glu Tyr Glu Val Gln Arg Leu Glu Lys	515	520	525
Glu Leu Lys Glu Ile Asp Glu Ser Asp Ser Glu Asp Tyr Leu Lys Glu	530	535	540
Gly Leu Arg Ala Pro Leu Gln Ser Lys Leu Asp Thr Lys Lys Ala Lys	545	550	555
Leu Ser Lys Leu Glu Glu Leu Ser Asp Lys Ile Asp Glu Leu Asp Ala	565	570	575
Glu Ile Ala Lys Leu Glu Val Gln Leu Lys Asp Ala Glu Gly Asn Asn	580	585	590
Asn Val Glu Ala Tyr Phe Lys Glu Gly Leu Glu Lys Thr Thr Ala Glu	595	600	605
Lys Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Leu Lys Lys Ala Val	610	615	620
Asp Glu Pro Glu Thr Pro Ala Pro Ala Pro Gln Pro Ala Pro Ala Pro	625	630	635
Glu Lys Pro Ala Glu Lys Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro	645	650	655

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Pro Lys Thr
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<213> Streptococcus pneumoniae

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Gly Val Val His Ala Glu Gly Val Arg Ser Gly Asn Asn Leu Thr Val
35 40 45

Thr Ser Ser Gly Gln Asp Ile Ser Lys Lys Tyr Ala Asp Glu Val Glu
50 55 60

Ser His Leu Glu Ser Ile Leu Lys Asp Val Lys Lys Asn Leu Lys Lys
65 70 75 80

Val Gln His Thr Gln Asn Val Gly Leu Ile Thr Lys Leu Ser Glu Ile
85 90 95

Lys Lys Lys Tyr Leu Tyr Asp Leu Lys Val Asn Val Leu Ser Glu Ala
100 105 110

Glu Leu Thr Ser Lys Thr Lys Glu Thr Lys Glu Lys Leu Thr Ala Thr
115 120 125

Phe Glu Gln Phe Lys Lys Asp Thr Leu Pro Thr Glu Pro Glu Lys Lys
130 135 140

Val Ala Glu Ala Gln Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu
145 150 155 160

Asp Gln Lys Glu Lys Asp Arg Arg Asn Tyr Pro Thr Ile Thr Tyr Lys

	165		170		175
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Glu Leu Glu Leu Val Lys Val Lys Ala Lys Glu Ser Gln Asp Glu Glu					
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Lys Ile Lys Gln Ala Glu Ala Glu Val Glu Ser Lys Gln Ala Glu Ala					
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Thr Arg Leu Lys Lys Ile Lys Thr Asp Arg Glu Glu Ala Lys Arg Lys					
	225		230		240
Ala Asp Ala Lys Leu Lys Glu Ala Val Glu Lys Asn Val Ala Thr Ser					
	245		250		255
Glu Gln Asp Lys Pro Lys Arg Arg Ala Lys Arg Gly Val Ser Gly Glu					
	260		265		270
Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser					
	275		280		285
Ser Val Gly Glu Glu Thr Leu Pro Ser Pro Ser Leu Asn Met Ala Asn					
	290		295		300
Glu Ser Gln Thr Glu His Arg Lys Asp Val Asp Glu Tyr Ile Lys Lys					
	305		310		320
Met Leu Ser Glu Ile Gln Leu Asp Gly Arg Lys His Thr Pro Asn Val					
	325		330		335
Asn Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu					
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Leu Ser Val Leu Lys Glu Asn Ser Lys Lys Glu Glu Leu Thr Ser Lys					
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Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe Lys Lys Asp Thr					
	370		375		380
Leu Lys Pro Glu Lys Lys Val Ala Glu Ala Glu Lys Lys Val Glu Glu					
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Ala Lys Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr					
	405		410		415
Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp					

420					425					430						
Val	Lys	Val	Lys	Glu	Ala	Glu	Leu	Glu	Leu	Val	Lys	Glu	Glu	Ala	Asn	
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Glu	Ser	Arg	Asn	Glu	Glu	Lys	Ile	Lys	Gln	Ala	Lys	Glu	Lys	Val	Glu	
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Ser	Lys	Lys	Ala	Glu	Ala	Thr	Arg	Leu	Glu	Lys	Ile	Lys	Thr	Asp	Arg	
465					470					475					480	
Lys	Lys	Ala	Glu	Glu	Glu	Ala	Lys	Arg	Lys	Ala	Glu	Glu	Ser	Glu	Lys	
485					490					495						
Lys	Ala	Ala	Glu	Ala	Lys	Gln	Lys	Val	Asp	Ala	Glu	Glu	Tyr	Ala	Leu	
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Glu	Ala	Lys	Ile	Ala	Glu	Leu	Glu	Tyr	Glu	Val	Gln	Arg	Leu	Glu	Lys	
515					520					525						
Glu	Leu	Lys	Glu	Ile	Asp	Glu	Ser	Asp	Ser	Glu	Asp	Tyr	Leu	Lys	Glu	
530					535					540						
Gly	Leu	Arg	Ala	Pro	Leu	Gln	Ser	Lys	Leu	Asp	Thr	Lys	Lys	Ala	Lys	
545					550					555					560	
Leu	Ser	Lys	Leu	Glu	Glu	Leu	Ser	Asp	Lys	Ile	Asp	Glu	Leu	Asp	Ala	
565					570					575						
Glu	Ile	Ala	Lys	Leu	Glu	Val	Gln	Leu	Lys	Asp	Ala	Glu	Gly	Asn	Asn	
580					585					590						
Asn	Val	Glu	Ala	Tyr	Phe	Lys	Glu	Gly	Leu	Glu	Lys	Thr	Thr	Ala	Glu	
595					600					605						
Lys	Lys	Ala	Glu	Leu	Glu	Lys	Ala	Glu	Ala	Asp	Leu	Lys	Lys	Ala	Val	
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Asp	Glu	Pro	Glu	Thr	Pro	Ala	Pro	Ala	Pro	Gln	Pro	Ala	Pro	Ala	Pro	
625					630					635					640	
Glu	Lys	Pro	Ala	Glu	Lys	Pro	Ala	Pro	Ala	Pro	Ala	Pro	Glu	Lys	Pro	
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Ser Tyr Asn Lys Ala Asn Glu Ser Gln Thr Glu His Arg Lys Ala Ala		
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Lys Gln Val Asp Glu Asp Ile Lys Lys Met Leu Ser Glu Ile Gln Glu		
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Tyr Ile Lys Lys Met Leu Ser Glu Ile Gln Leu Asp Lys Arg Lys His		
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Thr Gln Asn Val Asn Leu Asn Arg Lys Leu Ser Ala Ile Gln Thr Lys		
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Tyr Leu Tyr Glu Leu Arg Val Leu Lys Glu Lys Ser Lys Lys Glu Glu		
115	120	125
Leu Thr Ser Lys Thr Lys Lys Glu Leu Asp Ala Ala Phe Glu Lys Phe		
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Lys Lys Glu Glu Pro Glu Leu Thr Lys Lys Leu Ala Glu Ala Lys Gln		
145	150	155 160
Lys Ala Lys Ala Gln Lys Glu Glu Asp Phe Arg Asn Tyr Pro Thr Asn		
165	170	175

Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Phe Asp Val Lys Val			
180	185	190	
Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Pro Arg Asn			
195	200	205	
Glu Glu Lys Ile Lys Gln Ala Lys Ala Lys Val Glu Ser Lys Lys Ala			
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Glu Ala Thr Arg Leu Glu Glu Ile Lys Thr Glu Arg Lys Lys Ala Glu			
225	230	235	240
Glu Glu Ala Lys Arg Lys Ala Glu Glu Ser Glu Lys Lys Ala Ala Glu			
245	250	255	
Ala Lys Gln Lys Val Asp Thr Lys Glu Gln Gly Lys Pro Lys Arg Arg			
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Ala Lys Arg Gly Val Ser Gly Glu Leu Ala Thr Pro Asp Lys Lys Glu			
275	280	285	
Asn Asp Ala Lys Ser Ser Asp Ser Ser Val Gly Glu Glu Thr Leu Pro			
290	295	300	
Ser Pro Ser Leu Asn Ala Met Ala Asn Glu Ser Gln Thr Glu His Arg			
305	310	315	320
Lys Asp Val Asp Glu Tyr Ile Lys Lys Met Leu Ser Glu Ile Gln Leu			
325	330	335	
Asp Arg Arg Lys His Thr Gln Asn Val Asn Leu Asn Ile Lys Leu Ser			
340	345	350	
Ala Ile Lys Thr Lys Tyr Leu Tyr Glu Leu Ser Val Leu Lys Glu Asn			
355	360	365	
Ser Lys Lys Glu Glu Leu Thr Ser Lys Thr Lys Ala Glu Leu Thr Ala			
370	375	380	
Ala Phe Glu Gln Phe Lys Lys Asp Thr Leu Lys Pro Glu Lys Lys Val			
385	390	395	400
Ala Glu Ala Glu Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Lys Asp			
405	410	415	
Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr			
420	425	430	

Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Lys Val Lys Lys Ala Glu
 435 440 445
 Leu Glu Leu Val Lys Glu Glu Ala Asn Glu Ser Arg Asn Glu Glu Lys
 450 455 460
 Ile Lys Gln Ala Lys Glu Lys Val Glu Ser Lys Lys Ala Glu Ala Thr
 465 470 475 480
 Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala
 485 490 495
 Lys Arg Lys Ala Glu Glu Ser Glu Lys Lys Ala Ala Glu Ala Lys Gln
 500 505 510
 Lys Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala Glu Leu
 515 520 525
 Glu Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile Asp Glu
 530 535 540
 Ser Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro Leu Gln
 545 550 555 560
 Ser Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu Glu Leu
 565 570 575
 Ser Asp Lys Ile Asp Glu Leu Asp Ala Glu Ile Ala Lys Leu Glu Val
 580 585 590
 Gln Leu Lys Asp Ala Glu Gly Asn Asn Asn Val Glu Ala Tyr Phe Lys
 595 600 605
 Glu Gly Leu Glu Lys Thr Thr Ala Glu Lys Lys Ala Glu Leu Glu Lys
 610 615 620
 Ala Glu Ala Asp Leu Lys Lys Ala Val Asp Glu Pro Glu Thr Pro Ala
 625 630 635 640
 Pro Ala Pro Gln Pro Ala Pro Ala Pro Glu Lys Pro Ala Glu Lys Pro
 645 650 655
 Ala Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Ala Pro Glu Lys Pro
 660 665 670
 Ala Glu Lys Pro Ala Glu Lys Pro Ala Glu Glu Pro Ala Glu Lys Pro
 675 680 685

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Thr Pro Glu Thr Pro Lys Thr
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 <211> 496
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 4
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Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Val Met Ser
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Val Val His Ala Thr Glu Asn Glu Gly Ser Thr Gln Ala Ala Thr Ser
 35 40 45

Ser Asn Met Ala Lys Thr Glu His Arg Lys Ala Ala Lys Gln Val Val
 50 55 60

Asp Ile Lys Lys Met Leu Ser Glu Ile Gln Glu Tyr Ile Lys Lys Met
 65 70 75 80

Leu Ser Glu Ile Gln Leu Asp Lys Arg Lys His Thr Gln Asn Val Asn
 85 90 95

Leu Asn Arg Lys Leu Ser Ala Ile Gln Thr Lys Tyr Leu Tyr Glu Leu
 100 105 110

Arg Val Leu Lys Glu Lys Ser Lys Lys Glu Glu Leu Thr Ser Lys Thr
 115 120 125

Lys Lys Glu Leu Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp Thr Leu
 130 135 140

Lys Pro Gly Glu Lys Val Ala Glu Ala Lys Lys Lys Val Glu Glu Ala
 145 150 155 160

Lys Lys Lys Ala Glu Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro
 165 170 175

Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Phe Asp Val
 180 185 190

Lys Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu
 195 200 205
 Ser Arg Asn Glu Gly Thr Ile Lys Gln Ala Lys Glu Lys Val Glu Ser
 210 215 220
 Lys Lys Ala Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys
 225 230 235 240
 Lys Ala Glu Glu Glu Ala Lys Arg Lys Ala Glu Glu Ser Glu Lys Lys
 245 250 255
 Ala Ala Glu Ala Lys Gln Lys Val Asp Thr Lys Glu Gln Gly Lys Pro
 260 265 270
 Lys Arg Arg Ala Lys Arg Gly Val Ser Gly Glu Leu Ala Thr Pro Asp
 275 280 285
 Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser Ser Val Gly Glu Glu
 290 295 300
 Thr Leu Pro Ser Ser Ser Leu Lys Ser Gly Lys Lys Val Ala Glu Ala
 305 310 315 320
 Glu Lys Lys Val Glu Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu
 325 330 335
 Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Asp Leu
 340 345 350
 Glu Ile Ala Glu Ser Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu
 355 360 365
 Val Lys Glu Glu Ala Lys Glu Pro Arg Asp Glu Glu Lys Ile Lys Gln
 370 375 380
 Ala Lys Ala Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu
 385 390 395 400
 Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys
 405 410 415
 Ala Ala Glu Glu Asp Lys Val Lys Glu Lys Pro Ala Glu Gln Pro Gln
 420 425 430
 Pro Ala Pro Ala Thr Gln Pro Glu Lys Pro Ala Pro Lys Pro Glu Lys
 435 440 445

Pro Ala Glu Gln Pro Lys Ala Glu Lys Thr Asp Asp Gln Gln Ala Glu
 450 455 460

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Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr Pro Lys Thr
 485 490 495

<210> 5

<211> 444

<212> PRT

<213> Streptococcus pneumoniae

<400> 5

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Lys Met Leu Glu Arg Ile Gln Leu Asp Arg Arg Lys His Thr Gln Asn
 35 40 45

Val Ala Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Arg
 50 55 60

Glu Leu Asn Val Leu Glu Glu Lys Ser Lys Asp Glu Leu Pro Ser Glu
 65 70 75 80

Ile Lys Ala Lys Leu Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp Thr
 85 90 95

Leu Lys Pro Gly Glu Lys Val Ala Glu Ala Lys Lys Val Glu Glu Ala
 100 105 110

Lys Lys Lys Ala Glu Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro
 115 120 125

Thr Asn Thr Tyr Lys Thr Glu Leu Glu Ile Ala Glu Phe Asp Val Lys
 130 135 140

Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Ser

145	150	155	160
Arg Asn Glu Gly Thr Ile Lys Gln Ala Lys Glu Lys Val Glu Ser Lys			
	165	170	175
Lys Ala Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys			
	180	185	190
Ala Glu Glu Glu Ala Lys Arg Lys Ala Asp Ala Lys Leu Lys Glu Ala			
	195	200	205
Asn Val Ala Thr Ser Asp Gln Gly Lys Pro Lys Gly Arg Ala Lys Arg			
	210	215	220
Gly Val Pro Gly Glu Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala			
225	230	235	240
Lys Ser Ser Asp Ser Ser Val Gly Glu Glu Thr Leu Pro Ser Ser Ser			
	245	250	255
Leu Lys Leu Ser Gly Lys Lys Val Ala Glu Ala Glu Lys Lys Val Glu			
	260	265	270
Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp Arg Arg Asn			
	275	280	285
Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Asp Leu Glu Ile Ala Glu Ser			
	290	295	300
Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala			
305	310	315	320
Lys Glu Pro Arg Asp Glu Glu Lys Ile Lys Gln Ala Lys Ala Lys Val			
	325	330	335
Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp			
	340	345	350
Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala Glu Glu Asp			
	355	360	365
Lys Val Lys Glu Lys Pro Ala Glu Gln Pro Gln Pro Ala Pro Ala Thr			
	370	375	380
Gln Pro Glu Lys Pro Ala Pro Lys Pro Glu Lys Pro Ala Glu Gln Pro			
385	390	395	400
Lys Ala Glu Lys Thr Asp Asp Gln Gln Ala Glu Glu Asp Tyr Ala Arg			

405	410	415
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Thr Glu Lys Pro Ala Gln Pro Ser Thr Pro Lys Thr		
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<400> 6		
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35	40	45
Ser Ser Asn Met Ala Lys Thr Glu His Arg Lys Ala Ala Lys Gln Val		
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Val Asp Glu Tyr Ile Glu Lys Met Leu Arg Glu Ile Gln Leu Asp Arg		
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Arg Lys His Thr Gln Asn Val Ala Leu Asn Ile Lys Leu Ser Ala Ile		
85	90	95
Lys Thr Lys Tyr Leu Arg Glu Leu Asn Val Leu Glu Glu Lys Ser Lys		
100	105	110
Asp Glu Leu Pro Ser Glu Ile Lys Ala Lys Leu Asp Ala Ala Phe Glu		
115	120	125
Lys Phe Lys Lys Asp Thr Leu Lys Pro Gly Glu Lys Val Ala Glu Ala		
130	135	140
Lys Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu		
145	150	155 160
Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu		
165	170	175

Glu Ile Ala Glu Phe Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu
 180 185 190
 Val Lys Glu Glu Ala Lys Glu Ser Arg Asn Glu Gly Thr Ile Lys Gln
 195 200 205
 Ala Lys Glu Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu
 210 215 220
 Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys
 225 230 235 240
 Ala Asp Ala Lys Leu Lys Glu Ala Asn Val Ala Thr Ser Asp Gln Gly
 245 250 255
 Lys Pro Lys Gly Arg Ala Lys Arg Gly Val Pro Gly Glu Leu Ala Thr
 260 265 270
 Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser Ser Val Gly
 275 280 285
 Glu Glu Thr Leu Pro Ser Ser Ser Leu Lys Ser Gly Lys Lys Val Glu
 290 295 300
 Ala Glu Lys Lys Val Glu Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys
 305 310 315 320
 Glu Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Asp
 325 330 335
 Leu Glu Ile Ala Glu Ser Asp Val Lys Val Lys Glu Ala Glu Leu Glu
 340 345 350
 Leu Val Lys Glu Glu Ala Lys Glu Pro Arg Asp Glu Glu Lys Ile Lys
 355 360 365
 Gln Ala Lys Ala Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu
 370 375 380
 Glu Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg
 385 390 395 400
 Lys Ala Ala Glu Glu Asp Lys Val Lys Glu Lys Pro Ala Glu Gln Pro
 405 410 415
 Gln Pro Ala Pro Ala Thr Gln Pro Glu Lys Pro Ala Pro Lys Pro Glu
 420 425 430

Lys Pro Ala Glu Gln Pro Lys Ala Glu Lys Thr Asp Asp Gln Gln Ala
435 440 445

Glu Glu Asp Tyr Ala Arg Ser Glu Glu Glu Tyr Asn Arg Leu Thr Gln
450 455 460

Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr Pro Lys
465 470 475 480

Thr

<210> 7

<211> 307

<212> PRT

<213> Streptococcus pneumoniae

<400> 7

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Gly Val Val His Ala Glu Gly Val Arg Ser Glu Asn Thr Pro Lys Val
35 40 45

Thr Ser Ser Gly Glu Tyr Ile Glu Lys Met Leu Arg Glu Ile Gln Leu
50 55 60

Asp Arg Arg Lys His Thr Gln Asn Val Ala Leu Asn Ile Lys Ile Ser
65 70 75 80

Ala Ile Lys Thr Lys Tyr Leu Arg Glu Leu Asn Val Leu Glu Glu Lys
85 90 95

Ser Lys Asp Glu Leu Pro Ser Glu Ile Lys Ala Lys Leu Asp Ala Ala
100 105 110

Phe Glu Lys Phe Lys Lys Asp Thr Leu Lys Pro Gly Glu Lys Val Ala
115 120 125

Glu Ala Lys Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln
130 135 140

Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu
145 150 155 160

Glu Leu Glu Ile Ala Glu Phe Asp Val Lys Val Lys Glu Ala Glu Leu
165 170 175

Glu Leu Val Lys Glu Glu Ala Lys Glu Phe Arg Asn Glu Gly Thr Ile
180 185 190

Lys Gln Ala Lys Glu Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg
195 200 205

Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys
210 215 220

Arg Lys Ala Ala Glu Glu Asp Lys Val Lys Glu Lys Pro Ala Glu Gln
225 230 235 240

Pro Gln Pro Ala Pro Ala Thr Gln Pro Glu Lys Pro Ala Pro Lys Pro
245 250 255

Glu Lys Pro Ala Glu Gln Pro Lys Ala Glu Lys Thr Asp Asp Gln Gln
260 265 270

Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu
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Thr Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr
290 295 300

Pro Lys Thr
305

<210> 8
<211> 434
<212> PRT
<213> Streptococcus pneumoniae

<400> 8
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Gly Val Val His Ala Glu Gly Val Arg Ser Glu Asn Thr Pro Lys Val
35 40 45

Thr Ser Ser Gly Asp Glu Val Asp Glu Tyr Ile Lys Lys Met Leu Ser

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Glu Ile Gln Leu Asp Lys Arg Lys His Thr His Asn Phe Ala Leu Asn		
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Leu Lys Leu Ser Arg Ile Lys Thr Glu Tyr Leu Tyr Lys Leu Lys Val		
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Asn Val Leu Glu Glu Lys Ser Lys Ala Glu Leu Thr Ser Lys Thr Lys		
	100	105 110
Lys Glu Val Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp Thr Leu Lys		
	115	120 125
Leu Gly Glu Lys Val Ala Glu Ala Gln Lys Lys Val Glu Glu Ala Lys		
	130	135 140
Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp His Arg Asn Tyr Pro Thr		
145	150	155 160
Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Lys		
	165	170 175
Leu Lys Glu Ala Glu Leu Glu Leu Leu Lys Glu Glu Ala Lys Thr Arg		
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Asn Glu Asp Thr Ile Asn Gln Ala Lys Ala Lys Val Lys Ser Glu Gln		
	195	200 205
Ala Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr Asp Arg Glu Gln Ala		
	210	215 220
Glu Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Glu Lys Ala Glu		
225	230	235 240
Glu Ala Lys Arg Lys Ala Glu Ala Glu Glu Val Lys Asp Lys Leu Lys		
	245	250 255
Arg Arg Thr Lys Arg Ala Val Pro Gly Glu Pro Ala Thr Pro Asp Lys		
	260	265 270
Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser Ser Val Gly Glu Glu Thr		
	275	280 285
Leu Pro Ser Pro Ser Leu Lys Ser Gly Lys Lys Val Ala Glu Ala Gln		
	290	295 300
Lys Lys Val Ala Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu		

305		310		315		320
Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Asp Leu Glu						
	325		330		335	
Ile Ala Glu Ser Asp Val Lys Val Lys Glu Lys Pro Ala Glu Gln Pro						
	340		345		350	
Gln Pro Ala Pro Ala Pro Gln Pro Glu Lys Pro Thr Glu Glu Pro Glu						
	355		360		365	
Asn Pro Ala Pro Ala Pro Lys Pro Glu Asn Pro Ala Pro Lys Pro Glu						
	370		375		380	
Asn Pro Ala Glu Gln Pro Lys Ala Glu Lys Pro Ala Asp Gln Gln Ala						
385		390		395		400
Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu Thr						
	405		410		415	
Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr Pro						
	420		425		430	

Lys Thr

<210> 9
 <211> 487
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 9
 Met Phe Ala Ser Lys Asn Glu Arg Lys Val His Tyr Ser Ile Arg Lys
 1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Phe Met Gly
 20 25 30

Ser Val Val His Ala Thr Glu Lys Glu Val Thr Thr Gln Val Ala Thr
 35 40 45

Ser Phe Asn Lys Ala Asn Lys Ser Gln Thr Glu His Met Lys Ala Ala
 50 55 60

Lys Gln Val Asp Glu Tyr Ile Thr Lys Lys Leu Gln Leu Asp Arg Arg
 65 70 75 80

Lys His Thr Gln Asn Val Gly Leu Leu Thr Lys Leu Gly Val Ile Lys
 85 90 95

Thr Glu Tyr Leu His Arg Leu Ser Val Ser Lys Glu Lys Ser Glu Ala
 100 105 110

Glu Leu Pro Ser Glu Ile Lys Ala Lys Leu Asp Ala Ala Phe Glu Gln
 115 120 125

Phe Lys Lys Asp Thr Leu Pro Thr Glu Pro Gly Lys Lys Val Ala Glu
 130 135 140

Ala Glu Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys
 145 150 155 160

Glu Glu Asp Arg Arg Asn Tyr Pro Thr Ile Thr Tyr Lys Thr Leu Glu
 165 170 175

Leu Glu Ile Ala Glu Ser Asp Val Glu Val Lys Lys Ala Glu Leu Glu
 180 185 190

Leu Val Lys Glu Glu Ala Lys Gly Ser Arg Asn Glu Gln Lys Val Asn
 195 200 205

Gln Ala Lys Ala Lys Val Glu Ser Lys Gln Ala Glu Ala Thr Arg Leu
 210 215 220

Lys Lys Ile Lys Thr Asp Arg Glu Gln Ala Glu Thr Thr Arg Leu Glu
 225 230 235 240

Asn Ile Lys Thr Asp Arg Glu Lys Ala Glu Glu Ala Lys Arg Lys Ala
 245 250 255

Asp Ala Lys Glu Gln Asp Glu Ser Lys Arg Arg Val Lys Gly Gly Val
 260 265 270

Pro Gly Glu Gln Ala Thr Leu Asp Lys Lys Glu Asn Asp Ala Lys Ser
 275 280 285

Ser Asp Ser Ser Val Gly Glu Glu Thr Leu Pro Ser Pro Ser Leu Lys
 290 295 300

Ser Gly Lys Lys Val Ala Glu Ala Glu Lys Lys Val Ala Glu Ala Glu
 305 310 315 320

Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr
 325 330 335

Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Lys
 340 345 350

Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Ser
 355 360 365

Arg Asn Glu Glu Lys Val Lys Gln Ala Lys Ala Glu Val Glu Ser Lys
 370 375 380

Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys
 385 390 395 400

Ala Glu Glu Ala Lys Arg Lys Ala Ala Glu Ser Glu Lys Val Lys Glu
 405 410 415

Lys Pro Ala Glu Gln Pro Gln Pro Ala Pro Ala Pro Gln Pro Glu Lys
 420 425 430

Pro Ala Pro Ala Pro Lys Pro Glu Asn Pro Ala Glu Gln Pro Lys Ala
 435 440 445

Glu Lys Pro Ala Asp Gln Gln Ala Glu Glu Asp Tyr Ala Arg Arg Ser
 450 455 460

Glu Glu Glu Tyr Asn Arg Leu Thr Gln Gln Gln Pro Pro Lys Thr Glu
 465 470 475 480

Lys Pro Ala Gln Pro Ser Thr
 485

<210> 10

<211> 483

<212> PRT

<213> Streptococcus pneumoniae

<400> 10

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
 1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Val Met Gly
 20 25 30

Ser Val Val His Ala Thr Glu Asn Glu Gly Ser Thr Gln Ala Ala Thr
 35 40 45

Ser Ser Asn Met Ala Lys Thr Glu His Arg Lys Ala Ala Lys Gln Val
 50 55 60

Val	Asp	Glu	Tyr	Ile	Glu	Lys	Met	Leu	Arg	Glu	Ile	Gln	Leu	Asp	Arg	
65					70					75					80	
Arg	Lys	His	Thr	Gln	Asn	Val	Ala	Leu	Asn	Ile	Lys	Leu	Ser	Ala	Ile	
				85					90					95		
Lys	Thr	Lys	Tyr	Leu	Arg	Glu	Leu	Asn	Val	Leu	Glu	Glu	Lys	Ser	Lys	
			100					105					110			
Asp	Glu	Leu	Pro	Ser	Glu	Ile	Lys	Ala	Lys	Leu	Asp	Ala	Ala	Phe	Glu	
		115						120				125				
Lys	Phe	Lys	Lys	Asp	Thr	Leu	Lys	Pro	Gly	Glu	Lys	Val	Ala	Glu	Ala	
	130					135					140					
Lys	Lys	Lys	Val	Glu	Glu	Ala	Lys	Lys	Lys	Ala	Glu	Asp	Gln	Lys	Glu	
145					150					155					160	
Glu	Asp	Arg	Arg	Asn	Tyr	Pro	Thr	Asn	Thr	Tyr	Lys	Thr	Leu	Glu	Leu	
				165					170					175		
Glu	Ile	Ala	Glu	Phe	Asp	Val	Lys	Val	Lys	Glu	Ala	Glu	Leu	Glu	Leu	
		180						185					190			
Val	Lys	Glu	Glu	Ala	Lys	Glu	Ser	Arg	Asn	Glu	Gly	Thr	Ile	Lys	Gln	
		195					200					205				
Ala	Lys	Glu	Lys	Val	Glu	Ser	Lys	Lys	Ala	Glu	Ala	Thr	Arg	Leu	Glu	
	210						215				220					
Asn	Ile	Lys	Thr	Asp	Arg	Lys	Lys	Ala	Glu	Glu	Glu	Ala	Lys	Arg	Lys	
225					230					235				240		
Ala	Asp	Ala	Lys	Leu	Lys	Glu	Ala	Asn	Val	Ala	Thr	Ser	Asp	Gln	Gly	
				245					250					255		
Lys	Pro	Lys	Gly	Arg	Ala	Lys	Arg	Gly	Val	Pro	Gly	Glu	Leu	Ala	Thr	
			260					265					270			
Pro	Asp	Lys	Lys	Glu	Asn	Asp	Ala	Lys	Ser	Ser	Asp	Ser	Ser	Val	Gly	
		275					280					285				
Glu	Glu	Thr	Leu	Pro	Ser	Ser	Ser	Leu	Lys	Ser	Gly	Lys	Lys	Val	Ala	
	290						295				300					
Glu	Ala	Glu	Lys	Lys	Val	Glu	Glu	Ala	Glu	Lys	Lys	Ala	Lys	Asp	Gln	
305					310					315				320		

Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu
325 330 335

Asp Leu Glu Ile Ala Glu Ser Asp Val Lys Val Lys Glu Ala Glu Leu
340 345 350

Glu Leu Val Lys Glu Glu Ala Lys Glu Pro Arg Asp Glu Glu Lys Thr
355 360 365

Lys Gln Ala Lys Ala Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg
370 375 380

Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys
385 390 395 400

Arg Lys Ala Ala Glu Glu Asp Lys Val Lys Glu Lys Pro Ala Glu Gln
405 410 415

Pro Gln Pro Ala Pro Ala Thr Gln Pro Glu Lys Pro Ala Pro Lys Pro
420 425 430

Glu Lys Pro Ala Glu Gln Pro Lys Ala Glu Lys Thr Asp Asp Gln Gln
435 440 445

Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu
450 455 460

Ile Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Phe Thr
465 470 475 480

Pro Lys Thr

<210> 11

<211> 329

<212> PRT

<213> Streptococcus pneumoniae

<400> 11

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Val Gly Val Ala Ser Val Val Val Ala Ser Leu Val Met Gly
20 25 30

Ser Val Val His Ala Thr Glu Asn Glu Gly Ala Thr Gln Val Pro Thr

35	40	45															
Ser	Ser	Asn	Arg	Ala	Asn	Glu	Ser	Gln	Ala	Glu	Gln	Gly	Glu	Gln	Pro		
50					55					60							
Lys	Lys	Leu	Asp	Ser	Glu	Arg	Asp	Lys	Ala	Lys	Thr	Ala	Val	Ser	Glu		
65					70					75					80		
Tyr	Lys	Glu	Lys	Lys	Val	Ser	Glu	Ile	Tyr	Thr	Lys	Leu	Glu	Arg	Asp		
				85					90					95			
Arg	His	Lys	Asp	Thr	Val	Asp	Leu	Val	Asn	Lys	Leu	Gln	Glu	Ile	Lys		
			100					105					110				
Asn	Glu	Tyr	Leu	Asn	Lys	Ile	Val	Gln	Ser	Thr	Ser	Lys	Thr	Glu	Ile		
	115						120					125					
Gln	Gly	Leu	Ile	Thr	Thr	Ser	Arg	Ser	Lys	Leu	Asp	Glu	Ala	Val	Ser		
	130					135					140						
Lys	Tyr	Lys	Lys	Ala	Pro	Ser	Ser	Ser	Ser	Ser	Ser	Gly	Ser	Ser	Thr		
145					150					155					160		
Lys	Pro	Glu	Ala	Ser	Asp	Thr	Ala	Lys	Pro	Asn	Lys	Pro	Thr	Glu	Leu		
				165					170					175			
Glu	Lys	Lys	Val	Ala	Glu	Ala	Glu	Lys	Lys	Val	Glu	Glu	Ala	Lys	Lys		
			180					185					190				
Lys	Ala	Lys	Asp	Gln	Lys	Glu	Glu	Asp	Tyr	Arg	Asn	Tyr	Pro	Thr	Ile		
	195						200					205					
Thr	Tyr	Lys	Thr	Leu	Glu	Leu	Glu	Ile	Ala	Glu	Ser	Asp	Val	Glu	Val		
	210					215					220						
Lys	Lys	Ala	Glu	Leu	Glu	Leu	Val	Lys	Glu	Glu	Ala	Lys	Glu	Pro	Arg		
225					230					235				240			
Asn	Glu	Glu	Lys	Val	Lys	Gln	Ala	Lys	Ala	Lys	Val	Glu	Ser	Glu	Glu		
			245					250						255			
Thr	Glu	Ala	Thr	Arg	Leu	Glu	Lys	Ile	Lys	Thr	Asp	Arg	Lys	Lys	Ala		
		260					265						270				
Glu	Glu	Glu	Ala	Lys	Arg	Lys	Ala	Ala	Glu	Glu	Asp	Lys	Val	Lys	Glu		
	275						280				285						
Lys	Pro	Ala	Glu	Gln	Gln	Ala	Glu	Glu	Asp	Tyr	Ala	Arg	Arg	Ser	Glu		

290	295	300
Glu Glu Tyr Asn Arg Leu Thr Gln Gln Gln Pro Pro Lys Thr Glu Lys		
305	310	315 320
Pro Ala Gln Pro Ser Thr Pro Lys Thr		
325		
<210> 12		
<211> 513		
<212> PRT		
<213> Streptococcus pneumoniae		
<400> 12		
Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys		
1	5	10 15
Phe Ser Val Gly Ala Ser Val Val Val Ala Ser Leu Val Met Gly Ser		
	20	25 30
Val Val His Ala Thr Glu Asn Glu Gly Ala Thr Gln Val Pro Thr Ser		
	35	40 45
Ser Asn Arg Ala Asn Glu Ser Gln Ala Glu Gln Gly Glu Gln Pro Lys		
	50	55 60
Lys Leu Asp Ser Glu Arg Asp Lys Ala Arg Lys Glu Val Glu Glu Tyr		
	65	70 75 80
Val Lys Lys Ile Val Gly Glu Ser Tyr Ala Lys Ser Thr Lys Lys Arg		
	85	90 95
His Thr Ile Thr Val Ala Leu Val Asn Glu Leu Asn Asn Ile Lys Asn		
	100	105 110
Glu Tyr Leu Asn Lys Ile Val Glu Ser Thr Ser Glu Ser Gln Leu Gln		
	115	120 125
Ile Leu Met Met Glu Ser Arg Ser Lys Val Asp Glu Ala Val Ser Lys		
	130	135 140
Phe Glu Lys Asp Ser Ser Ser Ser Ser Ser Asp Ser Ser Thr Lys		
	145	150 155 160
Pro Glu Ala Ser Asp Thr Ala Lys Pro Asn Lys Pro Thr Glu Pro Gly		
	165	170 175

Glu Lys Val Ala Glu Ala Lys Lys Lys Val Glu Glu Ala Lys Lys Ala
 180 185 190
 Lys Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Ile Thr Tyr
 195 200 205
 Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Glu Val Lys Lys
 210 215 220
 Ala Glu Leu Glu Leu Val Lys Val Lys Ala Asn Glu Pro Arg Asp Glu
 225 230 235 240
 Gln Lys Ile Lys Gln Ala Glu Ala Glu Val Glu Ser Lys Gln Ala Glu
 245 250 255
 Ala Thr Arg Leu Lys Lys Ile Lys Thr Asp Arg Glu Glu Ala Glu Glu
 260 265 270
 Glu Ala Lys Arg Arg Ala Asp Ala Lys Glu Gln Gly Lys Pro Lys Gly
 275 280 285
 Arg Ala Lys Arg Gly Val Pro Gly Glu Leu Ala Thr Pro Asp Lys Lys
 290 295 300
 Glu Asn Asp Ala Lys Ser Ser Asp Ser Ser Val Gly Glu Glu Thr Leu
 305 310 315 320
 Pro Ser Pro Ser Leu Lys Pro Glu Lys Lys Val Ala Glu Ala Glu Lys
 325 330 335
 Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu Glu Asp
 340 345 350
 Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ile
 355 360 365
 Ala Glu Ser Asp Val Glu Val Lys Lys Ala Glu Leu Glu Leu Val Lys
 370 375 380
 Glu Glu Ala Lys Glu Pro Arg Asn Glu Glu Lys Val Lys Gln Ala Lys
 385 390 395 400
 Ala Glu Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile
 405 410 415
 Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala
 420 425 430

Glu Glu Asp Lys Val Lys Glu Lys Pro Ala Glu Gln Pro Gln Pro Ala
 435 440 445

Pro Ala Pro Lys Ala Glu Lys Pro Ala Pro Ala Pro Lys Pro Glu Asn
 450 455 460

Pro Ala Glu Gln Pro Lys Ala Glu Lys Pro Ala Asp Gln Gln Ala Glu
 465 470 475 480

Glu Glu Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu Thr Leu
 485 490 495

Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr Pro Lys
 500 505 510

Thr

<210> 13

<211> 511

<212> PRT

<213> Streptococcus pneumoniae

<400> 13

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
 1 5 10 15

Phe Ser Val Gly Ala Ser Val Val Val Ala Ser Leu Val Met Gly Ser
 20 25 30

Val Val His Ala Thr Glu Asn Glu Gly Ala Thr Gln Val Pro Thr Ser
 35 40 45

Ser Asn Arg Ala Asn Glu Ser Gln Ala Glu Gln Gly Glu Gln Pro Lys
 50 55 60

Lys Leu Asp Ser Glu Arg Asp Lys Ala Arg Lys Glu Val Glu Glu Tyr
 65 70 75 80

Val Lys Lys Ile Val Gly Glu Ser Tyr Ala Lys Ser Thr Lys Lys Arg
 85 90 95

His Thr Ile Thr Val Ala Leu Val Asn Glu Leu Asn Asn Ile Lys Asn
 100 105 110

Glu Tyr Leu Asn Lys Ile Val Glu Ser Thr Ser Glu Ser Gln Leu Gln
 115 120 125

Ile	Leu	Met	Met	Glu	Ser	Arg	Ser	Lys	Val	Asp	Glu	Ala	Val	Ser	Lys	130	135	140	
Phe	Glu	Lys	Asp	Ser	Ser	Ser	Ser	Ser	Ser	Ser	Asp	Ser	Ser	Thr	Lys	145	150	155	160
Pro	Glu	Ala	Ser	Asp	Thr	Ala	Lys	Pro	Asn	Lys	Pro	Thr	Glu	Pro	Gly	165	170	175	
Glu	Lys	Val	Ala	Glu	Ala	Lys	Lys	Lys	Val	Glu	Glu	Ala	Lys	Lys	Ala	180	185	190	
Lys	Asp	Gln	Lys	Glu	Glu	Asp	Arg	Arg	Asn	Tyr	Pro	Thr	Ile	Thr	Tyr	195	200	205	
Lys	Thr	Leu	Glu	Leu	Glu	Ile	Ala	Glu	Ser	Asp	Val	Glu	Val	Lys	Lys	210	215	220	
Ala	Glu	Leu	Glu	Leu	Val	Lys	Val	Lys	Ala	Asn	Glu	Pro	Arg	Asp	Glu	225	230	235	240
Gln	Lys	Ile	Lys	Gln	Ala	Glu	Ala	Glu	Val	Glu	Ser	Lys	Gln	Ala	Glu	245	250	255	
Ala	Thr	Arg	Leu	Lys	Lys	Ile	Lys	Thr	Asp	Arg	Glu	Glu	Ala	Glu	Glu	260	265	270	
Glu	Ala	Lys	Arg	Arg	Ala	Asp	Ala	Lys	Glu	Gln	Gly	Lys	Pro	Lys	Gly	275	280	285	
Arg	Ala	Lys	Arg	Gly	Val	Pro	Gly	Glu	Leu	Ala	Thr	Pro	Asp	Lys	Lys	290	295	300	
Glu	Asn	Asp	Ala	Lys	Ser	Ser	Asp	Ser	Ser	Val	Gly	Glu	Glu	Thr	Leu	305	310	315	320
Pro	Ser	Pro	Ser	Leu	Lys	Pro	Glu	Lys	Lys	Val	Ala	Glu	Ala	Glu	Lys	325	330	335	
Lys	Val	Glu	Glu	Ala	Lys	Lys	Lys	Ala	Glu	Asp	Gln	Lys	Glu	Glu	Asp	340	345	350	
Arg	Arg	Asn	Tyr	Pro	Thr	Asn	Thr	Tyr	Lys	Thr	Leu	Glu	Leu	Glu	Ile	355	360	365	
Ala	Glu	Ser	Asp	Val	Glu	Val	Lys	Lys	Ala	Glu	Leu	Glu	Leu	Val	Lys	370	375	380	

Glu Glu Ala Lys Glu Pro Arg Asn Glu Glu Lys Val Lys Gln Ala Lys
 385 390 395 400

Ala Glu Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile
 405 410 415

Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys Ala Ala
 420 425 430

Glu Glu Asp Lys Val Lys Glu Lys Pro Ala Glu Gln Pro Gln Pro Ala
 435 440 445

Pro Ala Pro Lys Ala Glu Lys Pro Ala Pro Ala Pro Lys Pro Glu Asn
 450 455 460

Pro Ala Glu Gln Pro Lys Ala Glu Lys Pro Ala Asp Gln Gln Ala Glu
 465 470 475 480

Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu Thr Gln
 485 490 495

Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr Pro
 500 505 510

<210> 14

<211> 589

<212> PRT

<213> Streptococcus pneumoniae

<400> 14

Glu Gly Val Arg Ser Gly Asn Asn Leu Thr Val Thr Ser Ser Gly Gln
 1 5 10 15

Asp Ile Ser Lys Lys Tyr Ala Asp Glu Val Glu Ser His Leu Glu Ser
 20 25 30

Ile Leu Lys Asp Val Lys Lys Asn Leu Lys Lys Val Gln His Thr Gln
 35 40 45

Asn Val Gly Leu Ile Thr Lys Leu Ser Glu Ile Lys Lys Lys Tyr Leu
 50 55 60

Tyr Asp Leu Lys Val Asn Val Leu Ser Glu Ala Glu Leu Thr Ser Lys
 65 70 75 80

Thr Lys Glu Thr Lys Glu Lys Leu Thr Ala Thr Phe Glu Gln Phe Lys

85					90					95					
Lys	Asp	Thr	Leu	Pro	Thr	Glu	Pro	Glu	Lys	Lys	Val	Ala	Glu	Ala	Gln
			100					105					110		
Lys	Lys	Val	Glu	Glu	Ala	Lys	Lys	Lys	Ala	Glu	Asp	Gln	Lys	Glu	Lys
		115					120					125			
Asp	Arg	Arg	Asn	Tyr	Pro	Thr	Ile	Thr	Tyr	Lys	Thr	Leu	Glu	Leu	Glu
	130						135				140				
Ile	Ala	Glu	Ser	Asp	Val	Glu	Val	Lys	Lys	Ala	Glu	Leu	Glu	Leu	Val
145					150					155					160
Lys	Val	Lys	Ala	Lys	Glu	Ser	Gln	Asp	Glu	Glu	Lys	Ile	Lys	Gln	Ala
				165					170					175	
Glu	Ala	Glu	Val	Glu	Ser	Lys	Gln	Ala	Glu	Ala	Thr	Arg	Leu	Lys	Lys
			180					185					190		
Ile	Lys	Thr	Asp	Arg	Glu	Glu	Ala	Lys	Arg	Lys	Ala	Asp	Ala	Lys	Leu
	195						200					205			
Lys	Glu	Ala	Val	Glu	Lys	Asn	Val	Ala	Thr	Ser	Glu	Gln	Asp	Lys	Pro
	210					215					220				
Lys	Arg	Arg	Ala	Lys	Arg	Gly	Val	Ser	Gly	Glu	Leu	Ala	Thr	Pro	Asp
225					230					235					240
Lys	Lys	Glu	Asn	Asp	Ala	Lys	Ser	Ser	Asp	Ser	Ser	Val	Gly	Glu	Glu
			245						250					255	
Thr	Leu	Pro	Ser	Pro	Ser	Leu	Asn	Met	Ala	Asn	Glu	Ser	Gln	Thr	Glu
			260					265					270		
His	Arg	Lys	Asp	Val	Asp	Glu	Tyr	Ile	Lys	Lys	Met	Leu	Ser	Glu	Ile
		275					280					285			
Gln	Leu	Asp	Arg	Arg	Lys	His	Thr	Gln	Asn	Val	Asn	Leu	Asn	Ile	Lys
	290					295					300				
Leu	Ser	Ala	Ile	Lys	Thr	Lys	Tyr	Leu	Tyr	Glu	Leu	Ser	Val	Leu	Lys
305					310					315					320
Glu	Asn	Ser	Lys	Lys	Glu	Glu	Leu	Thr	Ser	Lys	Thr	Lys	Ala	Glu	Leu
			325						330				335		
Thr	Ala	Ala	Phe	Glu	Gln	Phe	Lys	Lys	Asp	Thr	Leu	Lys	Pro	Glu	Lys

340	345	350
Lys Val Ala Glu Ala Glu Lys Lys Val Glu Glu Ala Lys Lys Lys Ala		
355	360	365
Lys Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr		
370	375	380
Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Lys Val Lys Glu		
385	390	395
Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Asn Glu Ser Arg Asn Glu		
405	410	415
Glu Lys Ile Lys Gln Ala Lys Glu Lys Val Glu Ser Lys Lys Ala Glu		
420	425	430
Ala Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu		
435	440	445
Glu Ala Lys Arg Lys Ala Glu Glu Ser Glu Lys Lys Ala Ala Glu Ala		
450	455	460
Lys Gln Lys Val Asp Ala Glu Glu Tyr Ala Leu Glu Ala Lys Ile Ala		
465	470	475
Glu Leu Glu Tyr Glu Val Gln Arg Leu Glu Lys Glu Leu Lys Glu Ile		
485	490	495
Asp Glu Ser Asp Ser Glu Asp Tyr Leu Lys Glu Gly Leu Arg Ala Pro		
500	505	510
Leu Gln Ser Lys Leu Asp Thr Lys Lys Ala Lys Leu Ser Lys Leu Glu		
515	520	525
Glu Leu Ser Asp Lys Ile Asp Glu Leu Asp Ala Glu Ile Ala Lys Leu		
530	535	540
Glu Val Gln Leu Lys Asp Ala Glu Gly Asn Asn Asn Val Glu Ala Tyr		
545	550	555
Phe Lys Glu Gly Leu Glu Lys Thr Thr Ala Glu Lys Lys Ala Glu Leu		
565	570	575
Glu Lys Ala Glu Ala Asp Leu Lys Lys Ala Val Asp Glu		
580	585	

<210> 15

<211> 21

<212> PRT

<213> Streptococcus pneumoniae

<400> 15

Lys Thr Gly Trp Lys Gln Glu Asn Gly Asn Trp Tyr Phe Tyr Asn Thr
1 5 10 15

Asp Gly Ser Met Ala
20

<210> 16

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 16

Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Met
1 5 10 15

Gly Ala Met Ala
20

<210> 17

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 17

Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
1 5 10 15

Gly Ser Met Ala
20

<210> 18

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 18

Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
1 5 10 15

Gly Ala Met Ala
20

<210> 19

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 19

Thr	Gly	Trp	Leu	Gln	Tyr	Asn	Gly	Ser	Trp	Tyr	Tyr	Leu	Asn	Ala	Asn
1				5					10					15	

Gly Asp Met Ala
20

<210> 20

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 20

Thr	Gly	Trp	Leu	Gln	Tyr	Asn	Gly	Ser	Trp	Tyr	Tyr	Leu	Asn	Ser	Asn
1				5					10					15	

Gly Ala Met Ala
20

<210> 21

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 21

Thr	Gly	Trp	Leu	Gln	Tyr	Asn	Gly	Ser	Trp	Tyr	Tyr	Leu	Asn	Ala	Asn
1				5					10					15	

Gly Asp Met Ala
20

<210> 22

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 22

Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
1 5 10 15

Gly Asp Met Ala
20

<210> 23

<211> 19

<212> PRT

<213> Streptococcus pneumoniae

<400> 23

Thr Gly Trp Leu Gln Tyr Asn Ser Trp Tyr Tyr Leu Asn Ala Asn Gly
1 5 10 15

Asp Met Ala

<210> 24

<211> 21

<212> PRT

<213> Streptococcus pneumoniae

<400> 24

Thr Gly Trp Val Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Ala Ser
1 5 10 15

Gly Ala Met Lys Ala
20

<210> 25

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 25

Ser Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr Tyr Val Asn Gly Ser
1 5 10 15

Gly Ala Leu Ala
20

<210> 26

<211> 18
<212> PRT
<213> Streptococcus pneumoniae

<400> 26
Val Asn Thr Thr Val Asp Gly Tyr Gly Val Asn Ala Asn Gly Glu Trp
1 5 10 15

Val Asn

<210> 27
<211> 20
<212> PRT
<213> Streptococcus pneumoniae

<400> 27
Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
1 5 10 15

Gly Ala Met Ala
20

<210> 28
<211> 20
<212> PRT
<213> Streptococcus pneumoniae

<400> 28
Thr Gly Trp Leu Gln Xaa Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
1 5 10 15

Gly Ala Met Ala
20

<210> 29
<211> 17
<212> PRT
<213> Streptococcus pneumoniae

<400> 29
Val Asn Thr Thr Val Asp Gly Tyr Lys Val Asn Ala Asn Gly Glu Trp
1 5 10 15

Val

<210> 30
<211> 20
<212> PRT
<213> Streptococcus pneumoniae

<400> 30
Ile Gly Trp Lys Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn Thr Asp
1 5 10 15

Gly Ser Met Ala
20

<210> 31
<211> 20
<212> PRT
<213> Streptococcus pneumoniae

<400> 31
Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ser Asn
1 5 10 15

Gly Ala Met Ala
20

<210> 32
<211> 20
<212> PRT
<213> Streptococcus pneumoniae

<400> 32
Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
1 5 10 15

Gly Ala Met Ala
20

<210> 33
<211> 20
<212> PRT
<213> Streptococcus pneumoniae

<400> 33

Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
 1 5 10 15

Gly Ala Met Ala
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<210> 34

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 34

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 1 5 10 15

Gly Asp Met Ala
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<210> 35

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 35

Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
 1 5 10 15

Gly Asp Met Ala
 20

<210> 36

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 36

Thr Gly Trp Ala Lys Val His Gly Ser Trp Tyr Tyr Leu Asn Ala Asn
 1 5 10 15

Gly Ser Met Ala
 20

<210> 37

<211> 21

<212> PRT

<213> Streptococcus pneumoniae

<400> 37

Thr Gly Trp Val Lys Asp Gly Glu Thr Trp Tyr Tyr Leu Glu Ala Ser
1 5 10 15

Gly Ser Met Lys Ala
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<210> 38

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 38

Asn Gln Trp Phe Gln Val Ser Asp Lys Trp Tyr Tyr Val Asn Gly Leu
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Gly Ser Leu Ser
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<210> 39

<211> 17

<212> PRT

<213> Streptococcus pneumoniae

<400> 39

Val Asn Thr Thr Val Asp Gly Tyr Lys Val Asn Ala Asn Gly Glu Trp
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Val

<210> 40

<211> 20

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<213> Streptococcus pneumoniae

<400> 40

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Gly Ser Met Ala
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<210> 41
<211> 21
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<213> Streptococcus pneumoniae

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Asp Gly Ser Met Ala
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<210> 42
<211> 20
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<213> Streptococcus pneumoniae

<400> 42
Thr Gly Trp Lys Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn Thr Asp
1 5 10 15

Gly Ser Met Ala
20

<210> 43
<211> 20
<212> PRT
<213> Streptococcus pneumoniae

<400> 43
Ile Gly Trp Lys Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn Thr Asp
1 5 10 15

Gly Ser Met Ala
20

<210> 44
<211> 21
<212> PRT
<213> Streptococcus pneumoniae

<400> 44
Thr Gly Trp Val Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Ala Ser

1	5	10	15
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Gly Ala Met Lys Ala
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<210> 45
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<213> Streptococcus pneumoniae

<400> 45
Thr Gly Trp Val Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Ala Ser
1 5 10 15

Gly Ala Met Lys Ala
20

<210> 46
<211> 21
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<213> Streptococcus pneumoniae

<400> 46
Thr Gly Trp Val Lys Asp Gly Glu Thr Trp Tyr Tyr Leu Glu Ala Ser
1 5 10 15

Gly Ser Met Lys Ala
20

<210> 47
<211> 20
<212> PRT
<213> Streptococcus pneumoniae

<400> 47
Ser Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr Tyr Val Asn Gly Ser
1 5 10 15

Gly Ala Leu Ala
20

<210> 48
<211> 20
<212> PRT

<213> Streptococcus pneumoniae

<400> 48

Ser Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr Tyr Val Asn Gly Leu
1 5 10 15

Gly Ala Leu Ala
20

<210> 49

<211> 20

<212> PRT

<213> Streptococcus pneumoniae

<400> 49

Asn Gln Trp Phe Gln Val Ser Asp Lys Trp Tyr Tyr Val Asn Gly Leu
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Gly Ser Leu Ser
20

<210> 50

<211> 18

<212> PRT

<213> Streptococcus pneumoniae

<400> 50

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1 5 10 15

Val Asn

<210> 51

<211> 17

<212> PRT

<213> Streptococcus pneumoniae

<400> 51

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Val

<210> 52
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 <213> Streptococcus pneumoniae

<400> 52
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 1 5 10 15
 Val

<210> 53
 <211> 539
 <212> PRT
 <213> Streptococcus pneumoniae

<400> 53
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 1 5 10 15
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 35 40 45
 Ser Ser Asn Met Ala Lys Thr Glu His Arg Lys Ala Ala Lys Gln Val
 50 55 60
 Val Asp Glu Tyr Ile Glu Lys Met Leu Arg Glu Ile Gln Leu Asp Arg
 65 70 75 80
 Arg Lys His Thr Gln Asn Val Ala Leu Asn Ile Lys Leu Ser Ala Ile
 85 90 95
 Lys Thr Lys Tyr Leu Arg Glu Leu Asn Val Leu Glu Glu Lys Ser Lys
 100 105 110
 Asp Glu Leu Pro Ser Glu Ile Lys Ala Lys Leu Asp Ala Ala Phe Glu
 115 120 125
 Lys Phe Lys Lys Asp Thr Leu Lys Pro Gly Glu Lys Val Ala Glu Ala
 130 135 140
 Lys Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu

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Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu						
	165		170		175	
Glu Ile Ala Glu Phe Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu						
	180		185		190	
Val Lys Glu Glu Ala Lys Glu Phe Arg Asn Glu Gly Thr Ile Lys Gln						
	195		200		205	
Ala Lys Glu Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu						
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Ala Ala Glu Glu Asp Lys Val Lys Glu Lys Pro Ala Glu Gln Pro Gln						
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Pro Ala Pro Ala Thr Gln Pro Glu Lys Pro Ala Pro Lys Pro Glu Lys						
	260		265		270	
Pro Ala Glu Gln Pro Lys Ala Glu Lys Thr Asp Asp Gln Gln Ala Glu						
	275		280		285	
Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu Thr Gln						
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Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr Pro Lys						
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Thr Gly Trp Lys Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn Thr Asp						
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Gly Ser Met Ala Thr Gly Trp Leu Gln Asn Asn Gly Ser Trp Tyr Tyr						
	340		345		350	
Leu Asn Ala Asn Gly Ala Met Ala Thr Gly Trp Leu Gln Asn Asn Gly						
	355		360		365	
Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Ser Met Ala Thr Gly Trp Leu						
	370		375		380	
Gln Asn Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Ala Met Ala						
	385		390		395	400
Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ser Asn						

405	410	415
Gly Ala Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr		
420	425	430
Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Leu Gln Asn Asn Gly		
435	440	445
Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Leu		
450	455	460
Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala		
465	470	475
480		
Thr Gly Trp Val Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Thr Ser		
485	490	495
Gly Ala Met Lys Ala Ser Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr		
500	505	510
Tyr Val His Gly Ser Ser Ala Leu Ala Ile Asn Thr Thr Val Tyr Gly		
515	520	525
Tyr Gly Val Asn Ala Asn Gly Glu Trp Val Asn		
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<210> 54

<211> 1620

<212> DNA

<213> Streptococcus pneumoniae

<400> 54

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gctaaacaag tcgtcgatga atatataaga aaaatggtga gggagattca actagataga 240
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gtagcagaag ctaagaagaa ggttgaagaa gctaagaaaa agccgagga tcaaaaagaa 480
gaagatcgtc gtaactaccc aaccaatact tacaaaaacgc ttgaacttga aattgctgag 540
ttcgatgtga aagttaaaga agcggagctt gaactagtaa aagaggaagc taaagaat 600
cgaaacgagg gcacaattaa gcaagcaaaa gagaaagttg agagtaaaaa agctgaggct 660
acaaggttag aaaacatcaa gacagatcgt aaaaaagcag aagaagaagc taaacgaaaa 720
gcagcagaag aagataaagt taaagaaaaa ccagctgaac aaccacaacc agcgccggct 780
actcaaccag aaaaaccagc tccaaaacca gagaagccag ctgaacaacc aaaagcagaa 840
aaaacagatg atcaacaagc tgaagaagac tatgctcgta gatcagaaga agaataataat 900

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cgcttgactc aacagcaacc gccaaaaact gaaaaaccag cacaaccatc tactccaaaa 960
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<210> 55

<211> 581

<212> PRT

<213> Streptococcus pneumoniae

<400> 55

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Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Val Met Gly
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Ser Val Val His Ala Thr Glu Asn Glu Gly Ser Thr Gln Ala Ala Thr
 35 40 45

Ser Ser Asn Met Ala Lys Thr Glu His Arg Lys Ala Ala Lys Gln Val
 50 55 60

Val Asp Glu Tyr Ile Glu Lys Met Leu Arg Glu Ile Gln Leu Asp Arg
 65 70 75 80

Arg Lys His Thr Gln Asn Val Ala Leu Asn Ile Lys Leu Ser Ala Ile
 85 90 95

Lys Thr Lys Tyr Leu Arg Glu Leu Asn Val Leu Glu Glu Lys Ser Lys
 100 105 110

Asp Glu Leu Pro Ser Glu Ile Lys Ala Lys Leu Asp Ala Ala Phe Glu
 115 120 125

Lys Phe Lys Lys Asp Thr Leu Lys Pro Gly Glu Lys Val Ala Glu Ala
 130 135 140

Lys Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu

405	410	415
Gly Ala Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr		
420	425	430
Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Leu Gln Asn Asn Gly		
435	440	445
Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Leu		
450	455	460
Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala		
465	470	475
480		
Thr Gly Trp Val Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Thr Ser		
485	490	495
Gly Ala Met Lys Ala Ser Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr		
500	505	510
Tyr Val His Gly Ser Ser Ala Leu Ala Ile Asn Thr Thr Val Tyr Gly		
515	520	525
Tyr Gly Val Asn Ala Asn Gly Glu Trp Val Asn		
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<210> 54

<211> 1620

<212> DNA

<213> Streptococcus pneumoniae

<400> 54

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gaagatcgtc gtaactaccc aaccaatact tacaaaacgc ttgaacttga aattgctgag 540
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cgaaacgagg gcacaattaa gcaagcaaaa gagaaagttg agagtaaaaa agctgaggct 660
acaaggttag aaaacatcaa gacagatcgt aaaaaagcag aagaagaagc taaacgaaaa 720
gcagcagaag aagataaagt taaagaaaaa ccagctgaac aaccacaacc agcgcgggct 780
actcaaccag aaaaaccagc tccaaaacca gagaagccag ctgaacaacc aaaagcagaa 840
aaaacagatg atcaacaagc tgaagaagac tatgctcgta gatcagaaga agaataaat 900

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cgcttgactc aacagcaacc gccaaaaact gaaaaaccag cacaaccatc tactccaaaa 960
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<210> 55

<211> 581

<212> PRT

<213> Streptococcus pneumoniae

<400> 55

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
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Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Val Met Gly
 20 25 30

Ser Val Val His Ala Thr Glu Asn Glu Gly Ser Thr Gln Ala Ala Thr
 35 40 45

Ser Ser Asn Met Ala Lys Thr Glu His Arg Lys Ala Ala Lys Gln Val
 50 55 60

Val Asp Glu Tyr Ile Glu Lys Met Leu Arg Glu Ile Gln Leu Asp Arg
 65 70 75 80

Arg Lys His Thr Gln Asn Val Ala Leu Asn Ile Lys Leu Ser Ala Ile
 85 90 95

Lys Thr Lys Tyr Leu Arg Glu Leu Asn Val Leu Glu Glu Lys Ser Lys
 100 105 110

Asp Glu Leu Pro Ser Glu Ile Lys Ala Lys Leu Asp Ala Ala Phe Glu
 115 120 125

Lys Phe Lys Lys Asp Thr Leu Lys Pro Gly Glu Lys Val Ala Glu Ala
 130 135 140

Lys Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu

145		150		155		160
Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu						
	165		170		175	
Glu Ile Ala Glu Phe Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu						
	180		185		190	
Val Lys Glu Glu Ala Lys Glu Ser Arg Asn Glu Gly Thr Ile Lys Gln						
	195		200		205	
Ala Lys Glu Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu						
	210		215		220	
Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys						
225		230		235		240
Ala Asp Ala Lys Leu Lys Glu Ala Asn Val Ala Thr Ser Asp Gln Gly						
	245		250		255	
Lys Pro Lys Gly Arg Ala Lys Arg Gly Val Pro Gly Glu Leu Ala Thr						
	260		265		270	
Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser Ser Val Gly						
	275		280		285	
Glu Glu Thr Leu Pro Ser Ser Ser Leu Lys Ser Gly Lys Lys Val Ala						
	290		295		300	
Glu Ala Glu Lys Lys Val Glu Glu Ala Glu Lys Lys Ala Lys Asp Gln						
305		310		315		320
Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu						
	325		330		335	
Asp Leu Glu Ile Ala Glu Ser Asp Val Lys Val Lys Glu Ala Glu Leu						
	340		345		350	
Glu Leu Val Lys Glu Glu Ala Lys Glu Pro Arg Asp Glu Glu Lys Ile						
	355		360		365	
Lys Gln Ala Lys Ala Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg						
	370		375		380	
Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys						
385		390		395		400
Arg Lys Ala Ala Glu Glu Asp Lys Val Lys Glu Lys Pro Ala Glu Gln						

405	410	415
Pro Gln Pro Ala Pro Ala Thr Gln Pro Glu Lys Pro Ala Pro Lys Pro		
420	425	430
Glu Lys Pro Ala Glu Gln Pro Lys Ala Glu Lys Thr Asp Asp Gln Gln		
435	440	445
Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu		
450	455	460
Ile Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Phe Thr		
465	470	475
Pro Lys Thr Gly Trp Lys Gln Glu Asn Gly Met Trp Tyr Phe Tyr Asn		
485	490	495
Thr Asp Gly Ser Met Ala Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp		
500	505	510
Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Val Lys Asp		
515	520	525
Gly Asp Thr Trp Tyr Tyr Leu Glu Ala Ser Gly Ala Met Lys Ala Ser		
530	535	540
Gln Trp Phe Lys Val Ser Asp Lys Trp Tyr Tyr Val Asn Gly Ser Gly		
545	550	555
Ala Leu Ala Val Asn Thr Thr Val Asp Gly Tyr Gly Val Asn Ala Asn		
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<210> 56

<211> 1746

<212> DNA

<213> Streptococcus pneumoniae

<400> 56

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gctaaacaag tcgtcgatga atatatagaa aaaatgttga gggagattca actagataga 240
agaaaacata cccaaaatgt cgccttaaac ataaagttga gcgcaattaa aacgaagtat 300
ttgcgtgaat taaatgtttt agaagagaag tcgaaagatg agttgccgctc agaaataaaa 360

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ttcgatgtga aagttaaaga agcggagctt gaactagtaa aagaggaagc taaagaatct 600
cgaaacgagg gcacaattaa gcaagcaaaa gagaaagttg agagtataaa agctgaggct 660
acaaggttag aaaacatcaa gacagatcgt aaaaaagcag aagaagaagc taaacgaaaa 720
gcagatgcta agttgaagga agctaatagt gcgacttcag atcaaggtaa accaaagggg 780
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<210> 57

<211> 663

<212> PRT

<213> Streptococcus pneumoniae

<400> 57

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    20                      25                     30

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```

Lys Met Leu Arg Glu Ile Gln Leu Asp Arg Arg Lys His Thr Gln Asn
    35                      40                     45

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```

Val Ala Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Arg
    50                      55                     60

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Glu Leu Asn Val Leu Glu Glu Lys Ser Lys Asp Glu Leu Pro Ser Glu
    65                      70                     75                     80

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Ile Lys Ala Lys Leu Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp Thr

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100					105					110						
Ala	Lys	Lys	Lys	Ala	Glu	Asp	Gln	Lys	Glu	Glu	Asp	Arg	Arg	Asn	Tyr	
115					120					125						
Pro	Thr	Asn	Thr	Tyr	Lys	Thr	Leu	Glu	Leu	Glu	Ile	Ala	Glu	Phe	Asp	
130					135					140						
Val	Lys	Val	Lys	Glu	Ala	Glu	Leu	Glu	Leu	Val	Lys	Glu	Glu	Ala	Lys	
145					150					155					160	
Glu	Ser	Arg	Asn	Glu	Gly	Thr	Ile	Lys	Gln	Ala	Lys	Glu	Lys	Val	Glu	
165					170					175						
Ser	Lys	Lys	Ala	Glu	Ala	Thr	Arg	Leu	Glu	Asn	Ile	Lys	Thr	Asp	Arg	
180					185					190						
Lys	Lys	Ala	Glu	Glu	Glu	Ala	Lys	Arg	Lys	Ala	Asp	Ala	Lys	Leu	Lys	
195					200					205						
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210					215					220						
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225					230					235					240	
Asp	Ala	Lys	Ser	Ser	Asp	Ser	Ser	Val	Gly	Glu	Glu	Thr	Leu	Pro	Ser	
245					250					255						
Ser	Ser	Leu	Lys	Ser	Gly	Lys	Lys	Val	Ala	Glu	Ala	Glu	Lys	Lys	Val	
260					265					270						
Glu	Glu	Ala	Glu	Lys	Lys	Ala	Lys	Asp	Gln	Lys	Glu	Glu	Asp	Arg	Arg	
275					280					285						
Asn	Tyr	Pro	Thr	Asn	Thr	Tyr	Lys	Thr	Leu	Asp	Leu	Glu	Ile	Ala	Glu	
290					295					300						
Ser	Asp	Val	Lys	Val	Lys	Glu	Ala	Glu	Leu	Glu	Leu	Val	Lys	Glu	Glu	
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Thr Gln Pro Glu Lys Pro Ala Pro Lys Pro Glu Lys Pro Ala Glu Gln		
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Leu Asn Ala Asn Gly Ser Met Ala Thr Gly Trp Leu Gln Asn Asn Gly		
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Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Ala Met Ala Thr Gly Trp Leu		
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Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ser Asn Gly Ala Met Ala		
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Thr Gly Trp Leu Gln Tyr Asn Gly Ser Trp Tyr Tyr Leu Asn Ala Asn		
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Ser Trp Tyr Tyr Leu Asn Ala Asn Gly Asp Met Ala Thr Gly Trp Val		

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600

605

Lys Asp Gly Asp Thr Trp Tyr Tyr Leu Glu Ala Ser Gly Ala Met Lys
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Ala Asn Gly Glu Trp Val Asn
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<213> Streptococcus pneumoniae

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<211> 929

<212> PRT

<213> Streptococcus pneumoniae

<400> 59

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Thr Ser Ser Gly Gln Asp Ile Ser Lys Lys Tyr Ala Asp Glu Val Glu
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Ser His Leu Glu Ser Ile Leu Lys Asp Val Lys Lys Asn Leu Lys Lys
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Val Gln His Thr Gln Asn Val Gly Leu Ile Thr Lys Leu Ser Glu Ile
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Lys Lys Lys Tyr Leu Tyr Asp Leu Lys Val Asn Val Leu Ser Glu Ala
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Glu Leu Thr Ser Lys Thr Lys Glu Thr Lys Glu Lys Leu Thr Ala Thr
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Phe Glu Gln Phe Lys Lys Asp Thr Leu Pro Thr Glu Pro Glu Lys Lys

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Lys Ile Lys Gln Ala Glu Ala Glu Val Glu Ser Lys Gln Ala Glu Ala		
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Thr Arg Leu Lys Lys Ile Lys Thr Asp Arg Glu Glu Ala Lys Arg Lys		
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Glu Ser Gln Thr Glu His Arg Lys Asp Val Asp Glu Tyr Ile Lys Lys		
	305	310 315 320
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Asn Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu		
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<211> 3463

<212> DNA

<213> Streptococcus pneumoniae

<400> 60

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<211> 690

<212> PRT

<213> Streptococcus pneumoniae

<400> 61

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Ser His Leu Glu Ser Ile Leu Lys Asp Val Lys Lys Asn Leu Lys Lys
65 70 75 80

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Phe	Glu	Gln	Phe	Lys	Lys	Asp	Thr	Leu	Pro	Thr	Glu	Pro	Glu	Lys	Lys	130	135	140	
Val	Ala	Glu	Ala	Gln	Lys	Lys	Val	Glu	Glu	Ala	Lys	Lys	Lys	Ala	Glu	145	150	155	160
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Thr	Arg	Leu	Lys	Lys	Ile	Lys	Thr	Asp	Arg	Glu	Glu	Ala	Lys	Arg	Lys	225	230	235	240
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 595 600 605

Lys Ala Glu Leu Glu Lys Ala Glu Ala Asp Leu Lys Lys Ala Val Asp
 610 615 620

Glu Pro Glu Thr Pro Ala Pro Ala Pro Gln Pro Ala Pro Ala Pro Glu
 625 630 635 640

Lys Pro Ala Glu Lys Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Ala
 645 650 655

Pro Glu Lys Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Ala Pro Glu
 660 665 670

Lys Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Thr Pro Glu Thr Pro
 675 680 685

Lys Thr
 690

<210> 62

<211> 701

<212> PRT

<213> Streptococcus pneumoniae

<400> 62

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
 1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Phe Leu Gly
 20 25 30

Gly Val Val His Ala Glu Gly Val Arg Ser Gly Asn Asn Leu Thr Val
 35 40 45

Thr Ser Ser Gly Gln Asp Ile Ser Lys Lys Tyr Ala Asp Glu Val Glu
 50 55 60

Ser His Leu Glu Ser Ile Leu Lys Asp Val Lys Lys Asn Leu Lys Lys
 65 70 75 80

Val Gln His Thr Gln Asn Val Gly Leu Ile Thr Lys Leu Ser Glu Ile
 85 90 95

Lys Lys Lys Tyr Leu Tyr Asp Leu Lys Val Asn Val Leu Ser Glu Ala
 100 105 110

Glu	Leu	Thr	Ser	Lys	Thr	Lys	Glu	Thr	Lys	Glu	Lys	Leu	Thr	Ala	Thr	115	120	125	
Phe	Glu	Gln	Phe	Lys	Lys	Asp	Thr	Leu	Pro	Thr	Glu	Pro	Glu	Lys	Lys	130	135	140	
Val	Ala	Glu	Ala	Gln	Lys	Lys	Val	Glu	Glu	Ala	Lys	Lys	Lys	Ala	Glu	145	150	155	160
Asp	Gln	Lys	Glu	Lys	Asp	Arg	Arg	Asn	Tyr	Pro	Thr	Ile	Thr	Tyr	Lys	165	170	175	
Thr	Leu	Glu	Leu	Glu	Ile	Ala	Glu	Ser	Asp	Val	Glu	Val	Lys	Lys	Ala	180	185	190	
Glu	Leu	Glu	Leu	Val	Lys	Val	Lys	Ala	Lys	Glu	Ser	Gln	Asp	Glu	Glu	195	200	205	
Lys	Ile	Lys	Gln	Ala	Glu	Ala	Glu	Val	Glu	Ser	Lys	Gln	Ala	Glu	Ala	210	215	220	
Thr	Arg	Leu	Lys	Lys	Ile	Lys	Thr	Asp	Arg	Glu	Glu	Ala	Lys	Arg	Lys	225	230	235	240
Ala	Asp	Ala	Lys	Leu	Lys	Glu	Ala	Val	Glu	Lys	Asn	Val	Ala	Thr	Ser	245	250	255	
Glu	Gln	Asp	Lys	Pro	Lys	Arg	Arg	Ala	Lys	Arg	Gly	Val	Ser	Gly	Glu	260	265	270	
Leu	Ala	Thr	Pro	Asp	Lys	Lys	Glu	Asn	Asp	Ala	Lys	Ser	Ser	Asp	Ser	275	280	285	
Ser	Val	Gly	Glu	Glu	Thr	Leu	Pro	Ser	Pro	Ser	Leu	Asn	Met	Ala	Asn	290	295	300	
Glu	Ser	Gln	Thr	Glu	His	Arg	Lys	Asp	Val	Asp	Glu	Tyr	Ile	Lys	Lys	305	310	315	320
Met	Leu	Ser	Glu	Ile	Gln	Leu	Asp	Arg	Arg	Lys	His	Thr	Gln	Asn	Val	325	330	335	
Asn	Leu	Asn	Ile	Lys	Leu	Ser	Ala	Ile	Lys	Thr	Lys	Tyr	Leu	Tyr	Glu	340	345	350	
Leu	Ser	Val	Leu	Lys	Glu	Asn	Ser	Lys	Lys	Glu	Glu	Leu	Thr	Ser	Lys	355	360	365	

Thr	Lys	Ala	Glu	Leu	Thr	Ala	Ala	Phe	Glu	Gln	Phe	Lys	Lys	Asp	Thr	370	375	380	
Leu	Lys	Pro	Glu	Lys	Lys	Val	Ala	Glu	Ala	Glu	Lys	Lys	Val	Glu	Glu	385	390	395	400
Ala	Lys	Lys	Lys	Ala	Lys	Asp	Gln	Lys	Glu	Glu	Asp	Arg	Arg	Asn	Tyr	405	410	415	
Pro	Thr	Asn	Thr	Tyr	Lys	Thr	Leu	Glu	Leu	Glu	Ala	Glu	Ser	Asp	Val	420	425	430	
Lys	Val	Lys	Glu	Ala	Glu	Leu	Glu	Leu	Val	Lys	Glu	Glu	Ala	Asn	Glu	435	440	445	
Ser	Arg	Asn	Glu	Glu	Lys	Ile	Lys	Gln	Ala	Lys	Glu	Lys	Val	Glu	Ser	450	455	460	
Lys	Lys	Ala	Glu	Ala	Thr	Arg	Leu	Glu	Lys	Ile	Lys	Thr	Asp	Arg	Lys	465	470	475	480
Lys	Ala	Glu	Glu	Glu	Ala	Lys	Arg	Lys	Ala	Glu	Glu	Ser	Glu	Lys	Lys	485	490	495	
Ala	Ala	Glu	Ala	Lys	Gln	Lys	Val	Asp	Ala	Glu	Glu	Tyr	Ala	Leu	Glu	500	505	510	
Ala	Lys	Ile	Ala	Glu	Leu	Glu	Tyr	Glu	Val	Gln	Arg	Leu	Glu	Lys	Glu	515	520	525	
Leu	Lys	Glu	Ile	Asp	Glu	Ser	Asp	Ser	Glu	Asp	Tyr	Leu	Lys	Glu	Gly	530	535	540	
Leu	Arg	Ala	Pro	Leu	Gln	Ser	Lys	Leu	Asp	Thr	Lys	Lys	Ala	Lys	Leu	545	550	555	560
Ser	Lys	Leu	Glu	Glu	Leu	Ser	Asp	Lys	Ile	Asp	Glu	Leu	Asp	Ala	Glu	565	570	575	
Ile	Ala	Lys	Leu	Glu	Val	Gln	Leu	Lys	Asp	Ala	Glu	Gly	Asn	Asn	Asn	580	585	590	
Val	Glu	Ala	Tyr	Phe	Lys	Glu	Gly	Leu	Glu	Lys	Thr	Thr	Ala	Glu	Lys	595	600	605	
Lys	Ala	Glu	Leu	Glu	Lys	Ala	Glu	Ala	Asp	Leu	Lys	Lys	Ala	Val	Asp	610	615	620	

Glu Pro Glu Thr Pro Ala Pro Ala Pro Gln Pro Ala Pro Ala Pro Glu
 625 630 635 640

Lys Pro Ala Glu Lys Pro Ala Pro Ala Pro Ala Pro Glu Lys Pro Ala
 645 650 655

Pro Ala Pro Glu Lys Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Ala
 660 665 670

Pro Glu Lys Pro Ala Pro Ala Pro Glu Lys Pro Ala Pro Ala Pro Glu
 675 680 685

Lys Pro Ala Pro Ala Pro Lys Pro Glu Thr Pro Glu Thr
 690 695 700

<210> 63

<211> 670

<212> PRT

<213> Streptococcus pneumoniae

<400> 63

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
 1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Val Val Ala Ser Leu Val Met Gly
 20 25 30

Ser Val Val His Ala Thr Glu Asn Glu Gly Ile Thr Gln Val Ala Thr
 35 40 45

Ser Tyr Asn Lys Ala Asn Glu Ser Gln Thr Glu His Arg Lys Ala Ala
 50 55 60

Lys Gln Val Asp Glu Asp Ile Lys Lys Met Leu Ser Glu Ile Gln Glu
 65 70 75 80

Tyr Ile Lys Lys Met Leu Ser Glu Ile Gln Leu Asp Lys Arg Lys His
 85 90 95

Thr Gln Asn Val Asn Leu Asn Arg Lys Leu Ser Ala Ile Gln Thr Lys
 100 105 110

Tyr Leu Tyr Glu Leu Arg Val Leu Lys Glu Lys Ser Lys Lys Glu Glu
 115 120 125

Leu Thr Ser Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu

130	135	140
Ile Ala Glu Phe Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu Val		
145	150	155 160
Lys Glu Glu Ala Lys Pro Arg Asn Glu Glu Lys Ile Lys Gln Ala Lys		
	165	170 175
Ala Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Glu Ile		
	180	185 190
Lys Thr Glu Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys Ala Glu		
	195	200 205
Glu Ser Glu Lys Lys Ala Ala Glu Ala Lys Gln Lys Val Asp Thr Lys		
	210	215 220
Glu Gln Gly Lys Pro Lys Arg Arg Ala Lys Arg Gly Val Ser Gly Glu		
	225	230 235 240
Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser		
	245	250 255
Ser Val Gly Glu Glu Thr Leu Pro Ser Pro Ser Leu Asn Met Ala Asn		
	260	265 270
Glu Ser Gln Thr Glu His Arg Lys Asp Val Asp Glu Tyr Ile Lys Lys		
	275	280 285
Met Leu Ser Glu Ile Gln Leu Asp Arg Arg Lys His Thr Gln Asn Val		
	290	295 300
Asn Leu Asn Ile Lys Leu Ser Ala Ile Lys Thr Lys Tyr Leu Tyr Glu		
	305	310 315 320
Leu Ser Val Leu Lys Glu Asn Ser Lys Lys Glu Glu Leu Thr Ser Lys		
	325	330 335
Thr Lys Ala Glu Leu Thr Ala Ala Phe Glu Gln Phe Lys Lys Asp Thr		
	340	345 350
Leu Lys Pro Glu Lys Lys Val Ala Glu Ala Glu Lys Lys Val Glu Glu		
	355	360 365
Ala Lys Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr		
	370	375 380
Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ala Glu Ser Asp Val		

385		390		395		400
Lys Val Asp Lys	Ala Glu Leu Glu	Leu Val Lys	Glu Glu Ala	Asn Glu		
	405		410		415	
Ser Arg Asn Glu	Glu Lys Ile Lys	Gln Ala Lys	Glu Lys Val	Glu Ser		
	420		425		430	
Lys Lys Ala Glu	Ala Thr Arg Leu	Glu Lys Ile Lys	Thr Asp Asp	Arg		
	435		440		445	
Lys Lys Ala Glu	Glu Glu Ala Lys	Arg Lys Ala	Glu Glu Ser	Glu Lys		
	450		455		460	
Lys Ala Ala Glu	Ala Lys Gln Lys	Val Asp Ala	Glu Glu Tyr	Ala Leu		
465		470		475		480
Glu Ala Lys Ile	Ala Glu Leu Glu	Tyr Glu Val	Gln Arg Leu	Glu Lys		
	485		490		495	
Glu Leu Lys Glu	Ile Asp Glu Ser	Asp Ser Glu	Asp Tyr Leu	Lys Glu		
	500		505		510	
Gly Leu Arg Ala	Pro Leu Gln Ser	Lys Leu Asp	Thr Lys Lys	Ala Lys		
	515		520		525	
Leu Ser Lys Leu	Glu Glu Leu Ser	Asp Lys Ile	Asp Glu Leu	Asp Ala		
	530		535		540	
Glu Ile Ala Lys	Leu Glu Val Gln	Leu Lys Asp	Ala Glu Gly	Asn Asn		
545		550		555		560
Asn Val Glu Ala	Tyr Phe Lys Glu	Gly Leu Glu	Lys Thr Thr	Ala Glu		
	565		570		575	
Lys Lys Ala Glu	Leu Glu Lys Ala	Glu Ala Asp	Leu Lys Lys	Ala Val		
	580		585		590	
Asp Glu Pro Glu	Thr Pro Ala Pro	Ala Pro Gln	Pro Ala Pro	Ala Pro		
	595		600		605	
Glu Lys Pro Ala	Glu Lys Pro Ala	Pro Ala Pro	Ala Pro Glu	Lys Pro		
	610		615		620	
Ala Pro Ala Pro	Glu Lys Pro Ala	Glu Lys Pro	Ala Glu Lys	Pro Ala		
625		630		635		640
Glu Glu Pro Ala	Glu Lys Pro Ala	Pro Ala Pro	Glu Lys Pro	Ala Pro		

645	650	655
Thr Pro Glu Lys Pro Ala Pro Thr	Pro Glu Thr Pro Lys Thr	
660	665	670
<210> 64		
<211> 437		
<212> PRT		
<213> Streptococcus pneumoniae		
<400> 64		
Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys		
1	5	10 15
Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Val Met Gly		
20	25	30
Ser Val Val His Ala Thr Glu Asn Glu Gly Ser Thr Gln Ala Ala Thr		
35	40	45
Ser Ser Asn Met Ala Lys Thr Glu His Arg Lys Ala Ala Lys Gln Val		
50	55	60
Val Asp Glu Tyr Ile Glu Lys Met Leu Ser Glu Ile Gln Leu Asp Arg		
65	70	75 80
Arg Lys His Thr Gln Asn Val Ala Leu Asn Ile Lys Leu Ser Ala Ile		
85	90	95
Lys Thr Lys Tyr Leu Arg Glu Leu Asn Val Leu Glu Glu Lys Ser Lys		
100	105	110
Asp Glu Leu Pro Ser Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Glu		
115	120	125
Leu Glu Ile Ala Glu Phe Asp Val Lys Val Lys Glu Ala Glu Leu Glu		
130	135	140
Leu Val Lys Glu Glu Ala Lys Glu Ser Arg Asn Glu Gly Thr Ile Lys		
145	150	155 160
Gln Ala Lys Glu Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu		
165	170	175
Glu Asn Glu Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys		
180	185	190

Arg Lys Ala Asp Gly Lys Leu Lys Glu Ala Asn Val Ala Thr Ser Asp
 195 200 205
 Gln Gly Lys Pro Lys Gly Arg Ala Lys Arg Gly Val Pro Gly Glu Leu
 210 215 220
 Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys Ser Ser Asp Ser Ser
 225 230 235 240
 Val Gly Glu Glu Thr Leu Pro Ser Ser Ser Leu Lys Ser Gly Lys Lys
 245 250 255
 Val Ala Glu Ala Glu Lys Lys Val Glu Glu Ala Glu Lys Lys Ala Lys
 260 265 270
 Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys
 275 280 285
 Thr Leu Asp Glu Leu Glu Ala Glu Ser Asp Val Lys Val Lys Glu Ala
 290 295 300
 Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Pro Arg Asp Glu Glu
 305 310 315 320
 Lys Ile Lys Gln Ala Lys Ala Lys Val Glu Ser Lys Lys Ala Glu Ala
 325 330 335
 Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu
 340 345 350
 Ala Lys Arg Lys Ala Ala Glu Glu Asp Lys Val Lys Glu Lys Pro Ala
 355 360 365
 Glu Gln Pro Gln Pro Ala Pro Ala Pro Gln Pro Glu Lys Pro Ala Pro
 370 375 380
 Lys Pro Glu Lys Pro Ala Glu Gln Pro Lys Ala Glu Lys Thr Asp Asp
 385 390 395 400
 Gln Gln Ala Glu Glu Asp Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn
 405 410 415
 Arg Leu Thr Gln Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro
 420 425 430
 Ser Thr Pro Lys Thr
 435

<210> 65

<211> 478

<212> PRT

<213> Streptococcus pneumoniae

<400> 65

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Phe Leu Gly
20 25 30

Gly Val Val His Ala Glu Gly Val Arg Ser Glu Asn Thr Pro Val Thr
35 40 45

Ser Ser Gly Asp Glu Val Asp Glu Tyr Ile Lys Lys Met Leu Ser Glu
50 55 60

Ile Gln Leu Asp Lys Arg Lys His Thr His Asn Phe Ala Leu Asn Leu
65 70 75 80

Lys Leu Ser Arg Ile Lys Thr Glu Tyr Leu Tyr Lys Leu Lys Val Asn
85 90 95

Val Leu Glu Glu Lys Ser Lys Ala Glu Leu Thr Ser Lys Thr Lys Lys
100 105 110

Glu Val Asp Ala Ala Phe Glu Lys Phe Lys Lys Asp Thr Leu Lys Leu
115 120 125

Gly Glu Lys Val Ala Glu Ala Gln Lys Lys Val Glu Glu Ala Lys Lys
130 135 140

Lys Ala Lys Asp Gln Lys Glu Glu Asp His Arg Asn Tyr Pro Thr Asn
145 150 155 160

Thr Tyr Lys Thr Leu Glu Leu Glu Ile Ala Glu Ser Asp Val Lys Val
165 170 175

Lys Glu Ala Glu Leu Glu Leu Leu Lys Glu Glu Ala Lys Thr Arg Asn
180 185 190

Glu Asp Thr Ile Asn Gln Ala Lys Ala Lys Val Lys Ser Glu Gln Ala
195 200 205

Glu Ala Thr Arg Leu Lys Lys Ile Lys Thr Asp Arg Glu Gln Ala Glu
210 215 220

Ala Thr Arg Leu Glu Asn Ile Lys Thr Asp Arg Glu Lys Ala Glu Glu
 225 230 235 240

Ala Lys Arg Lys Ala Glu Ala Glu Glu Val Lys Asp Lys Leu Lys Arg
 245 250 255

Arg Thr Lys Arg Ala Val Pro Gly Glu Pro Ala Thr Pro Asp Lys Lys
 260 265 270

Glu Asn Asp Ala Lys Ser Ser Asp Ser Ser Val Gly Glu Glu Thr Leu
 275 280 285

Pro Ser Pro Ser Leu Lys Ser Gly Lys Lys Val Ala Glu Ala Gln Lys
 290 295 300

Lys Val Ala Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp
 305 310 315 320

Arg Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Leu Asp Leu Glu Ala
 325 330 335

Glu Ser Asp Val Lys Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu
 340 345 350

Glu Ala Lys Glu Ser Arg Asn Glu Glu Lys Val Lys Gln Ala Lys Ala
 355 360 365

Lys Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile Lys
 370 375 380

Thr Asp Arg Lys Lys Ala Glu Glu Ala Lys Arg Arg Ala Ala Glu Glu
 385 390 395 400

Asp Lys Val Lys Glu Lys Pro Ala Glu Gln Pro Glu Lys Pro Thr Glu
 405 410 415

Glu Pro Glu Asn Pro Ala Pro Ala Pro Lys Pro Glu Asn Pro Ala Glu
 420 425 430

Gln Pro Lys Ala Glu Lys Pro Ala Asp Gln Gln Ala Glu Glu Asp Tyr
 435 440 445

Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu Thr Gln Gln Gln Pro
 450 455 460

Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr Pro Lys Thr
 465 470 475

<210> 66

<211> 487

<212> PRT

<213> Streptococcus pneumoniae

<400> 66

Met Phe Ala Ser Lys Asn Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Ala Val Ala Ser Leu Phe Met Gly
20 25 30

Ser Val Val His Ala Thr Glu Lys Glu Val Thr Thr Gln Val Ala Thr
35 40 45

Ser Phe Asn Lys Ala Asn Lys Ser Gln Thr Glu His Met Lys Ala Ala
50 55 60

Lys Gln Val Asp Glu Tyr Ile Thr Lys Lys Leu Gln Leu Asp Arg Arg
65 70 75 80

Lys His Thr Gln Asn Val Gly Leu Leu Thr Lys Leu Gly Val Ile Lys
85 90 95

Thr Glu Tyr Leu His Arg Leu Ser Val Ser Lys Glu Lys Ser Glu Ala
100 105 110

Glu Leu Pro Ser Glu Ile Lys Ala Lys Leu Asp Ala Ala Phe Glu Gln
115 120 125

Phe Lys Lys Asp Thr Leu Pro Thr Glu Pro Gly Lys Lys Val Ala Glu
130 135 140

Ala Glu Lys Lys Val Glu Glu Ala Lys Lys Lys Ala Glu Asp Gln Lys
145 150 155 160

Glu Glu Asp Arg Arg Asn Tyr Pro Thr Ile Thr Tyr Lys Thr Leu Glu
165 170 175

Leu Glu Ile Ala Glu Ser Asp Val Glu Val Lys Lys Ala Glu Leu Glu
180 185 190

Leu Val Lys Glu Glu Ala Lys Gly Ser Arg Asn Glu Gln Lys Val Asn
195 200 205

Gln Ala Lys Ala Lys Val Glu Ser Lys Gln Ala Glu Ala Thr Arg Leu

210	215	220
Lys Lys Ile Lys Thr Asp Arg Glu Gln Ala Glu Ala Thr Arg Leu Glu 225	230	235 240
Asn Ile Lys Thr Asp Arg Glu Lys Ala Glu Glu Ala Lys Arg Lys Ala 245	250	255
Glu Ala Glu Glu Val Lys Asp Lys Leu Lys Arg Arg Thr Lys Arg Ala 260	265	270
Val Pro Gly Glu Pro Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala Lys 275	280	285
Ser Ser Asp Ser Ser Val Gly Glu Glu Thr Leu Pro Ser Pro Ser Leu 290	295	300
Lys Ser Gly Lys Lys Val Ala Glu Ala Glu Lys Lys Val Ala Glu Ala 305	310	315 320
Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr Pro 325	330	335
Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ala Glu Ser Asp Val Lys 340	345	350
Val Lys Glu Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu Ser 355	360	365
Arg Asn Glu Glu Lys Val Lys Gln Ala Lys Ala Glu Val Glu Ser Lys 370	375	380
Lys Ala Glu Ala Thr Arg Leu Glu Lys Ile Lys Thr Asp Arg Lys Lys 385	390	395 400
Ala Glu Glu Ala Lys Arg Lys Ala Ala Glu Glu Asp Lys Val Lys Glu 405	410	415
Lys Pro Ala Glu Gln Pro Gln Pro Ala Pro Ala Pro Gln Pro Glu Lys 420	425	430
Pro Ala Pro Ala Pro Lys Pro Glu Asn Pro Ala Glu Gln Pro Lys Ala 435	440	445
Glu Lys Pro Ala Asp Gln Gln Ala Glu Glu Asp Tyr Ala Arg Arg Ser 450	455	460
Glu Glu Glu Tyr Asn Arg Leu Thr Gln Gln Gln Pro Pro Lys Thr Glu		

465 470 475 480
 Lys Pro Ala Gln Pro Ser Thr
 485

 <210> 67
 <211> 451
 <212> PRT
 <213> Streptococcus pneumoniae

 <400> 67
 Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
 1 5 10 15

 Phe Ser Val Gly Val Ala Ser Val Val Val Ala Ser Leu Val Met Gly
 20 25 30

 Ser Val Val His Ala Thr Glu Asn Glu Gly Ala Thr Gln Val Pro Thr
 35 40 45

 Ser Ser Asn Arg Ala Asn Glu Ser Gln Ala Glu Gln Gly Glu Gln Pro
 50 55 60

 Lys Lys Leu Asp Ser Glu Arg Asp Lys Ala Arg Lys Glu Val Glu Glu
 65 70 75 80

 Tyr Val Lys Lys Ile Val Gly Glu Ser Tyr Ala Lys Ser Thr Lys Lys
 85 90 95

 Arg His Thr Ile Thr Val Ala Leu Val Asn Glu Leu Asn Asn Ile Lys
 100 105 110

 Asn Glu Tyr Leu Asn Lys Ile Val Glu Ser Thr Ser Glu Ser Gln Leu
 115 120 125

 Gln Ile Leu Met Met Asn Tyr Pro Thr Ile Thr Tyr Lys Thr Leu Glu
 130 135 140

 Leu Glu Ile Ala Glu Ser Asp Val Glu Val Lys Lys Ala Glu Leu Glu
 145 150 155 160

 Leu Val Lys Val Lys Ala Asn Glu Pro Arg Asp Glu Gln Lys Ile Lys
 165 170 175

 Gln Ala Glu Ala Glu Val Glu Ser Lys Gln Ala Glu Ala Thr Arg Leu
 180 185 190

Lys Lys Ile Lys Thr Asp Arg Glu Glu Ala Glu Glu Glu Ala Lys Arg
 195 200 205
 Arg Ala Asp Ala Lys Glu Gln Gly Lys Pro Lys Gly Arg Ala Lys Arg
 210 215 220
 Gly Val Pro Gly Glu Leu Ala Thr Pro Asp Lys Lys Glu Asn Asp Ala
 225 230 235 240
 Lys Ser Ser Asp Ser Ser Val Gly Glu Glu Thr Leu Pro Ser Pro Ser
 245 250 255
 Leu Lys Pro Glu Lys Lys Val Ala Glu Ala Glu Lys Lys Val Glu Glu
 260 265 270
 Ala Lys Lys Lys Ala Glu Asp Gln Lys Glu Glu Asp Arg Arg Asn Tyr
 275 280 285
 Pro Thr Asn Thr Tyr Lys Thr Leu Glu Leu Glu Ala Glu Ser Asp Val
 290 295 300
 Glu Val Lys Lys Ala Glu Leu Glu Leu Val Lys Glu Glu Ala Lys Glu
 305 310 315 320
 Pro Arg Asn Glu Glu Lys Val Lys Gln Ala Lys Ala Glu Val Glu Ser
 325 330 335
 Lys Lys Ala Glu Val Glu Ser Lys Lys Ala Glu Ala Thr Arg Leu Glu
 340 345 350
 Lys Ile Lys Thr Asp Arg Lys Lys Ala Glu Glu Glu Ala Lys Arg Lys
 355 360 365
 Ala Ala Glu Glu Asp Lys Val Lys Glu Lys Pro Ala Glu Gln Pro Gln
 370 375 380
 Pro Ala Pro Ala Pro Lys Ala Glu Lys Pro Ala Pro Ala Pro Lys Pro
 385 390 395 400
 Glu Asn Pro Ala Glu Gln Pro Lys Ala Glu Lys Pro Ala Asp Gln Gln
 405 410 415
 Ala Glu Glu Glu Tyr Ala Arg Arg Ser Glu Glu Glu Tyr Asn Arg Leu
 420 425 430
 Thr Leu Gln Gln Pro Pro Lys Thr Glu Lys Pro Ala Gln Pro Ser Thr
 435 440 445

Pro Lys Thr
450

<210> 68

<211> 730

<212> PRT

<213> Streptococcus pneumoniae

<400> 68

Met Phe Ala Ser Lys Ser Glu Arg Lys Val His Tyr Ser Ile Arg Lys
1 5 10 15

Phe Ser Ile Gly Val Ala Ser Val Val Val Ala Ser Leu Phe Leu Gly
20 25 30

Gly Val Val His Ala Glu Glu Val Arg Arg Gly Asn Asn Leu Thr Val
35 40 45

Thr Ser Ser Gly Asp Glu Val Glu Ser His Tyr Gln Ser Ile Leu Glu
50 55 60

Lys Val Arg Lys Ser Leu Glu Lys Asp Arg His Thr Gln Asn Val Asp
65 70 75 80

Leu Ile Lys Lys Leu Gln Asp Ile Lys Arg Thr Tyr Leu Tyr Asn Leu
85 90 95

Lys Glu Lys Pro Glu Ala Glu Leu Thr Ser Lys Thr Asn Lys Glu Leu
100 105 110

Asp Ala Ala Phe Glu Lys Phe Lys Lys Glu Pro Glu Leu Thr Lys Lys
115 120 125

Leu Ala Glu Ala Glu Lys Lys Ala Lys Asp Gln Lys Glu Glu Asp His
130 135 140

Arg Asn Tyr Pro Thr Asn Thr Tyr Lys Thr Ile Glu Leu Glu Ile Ala
145 150 155 160

Glu Ala Glu Val Gly Val Ala Lys Ala Glu Leu Glu Leu Ala Gln Ala
165 170 175

Gln Val Gln Ile Pro Gln Asp Thr Glu Lys Ile Asn Ala Ala Lys Ala
180 185 190

Lys Val Glu Ala Ala Lys Ser Asn Val Lys Lys Leu Glu Lys Ile Lys
195 200 205

Ser Asp Ile Glu Lys Thr Tyr Leu Tyr Lys Leu Asp Asn Ser Thr Lys
 210 215 220

Glu Thr Pro Lys Ser Arg Val Arg Arg Asn Ser Pro Gln Val Gly Asp
 225 230 235 240

Ser Arg Glu Leu Lys Glu Thr Ile Asp Lys Ala Lys Glu Thr Leu Ser
 245 250 255

Thr Tyr Met Val Thr Arg Leu Thr Lys Leu Asp Pro Ser Val Phe Trp
 260 265 270

Phe Ala Asp Leu Leu Met Asp Ala Lys Lys Val Val Glu Glu Tyr Lys
 275 280 285

Thr Lys Leu Glu Asp Ala Ser Asp Lys Lys Ser Val Glu Asp Leu Arg
 290 295 300

Lys Glu Ala Glu Gly Lys Ile Glu Ser Leu Ile Val Thr His Gln Asn
 305 310 315 320

Arg Glu Lys Glu Asn Gln Pro Ala Pro Gln Pro Gly Gly Gln Ala Gly
 325 330 335

Gly Ser Met Val Val Pro Pro Val Thr Gln Thr Pro Pro Ser Thr Ser
 340 345 350

Gln Ser Pro Gly Gln Lys Ala Thr Glu Ala Glu Lys Lys Lys Leu Gln
 355 360 365

Asp Leu Ile Arg Gln Phe Gln Glu Ala Leu Asn Lys Leu Asp Asp Glu
 370 375 380

Thr Lys Thr Val Pro Asp Gly Ala Lys Leu Thr Gly Glu Ala Gly Lys
 385 390 395 400

Ala Tyr Asn Glu Thr Arg Thr Tyr Ala Lys Glu Val Val Asp Lys Ser
 405 410 415

Lys Lys Leu Leu Ser Gln Thr Ala Val Thr Met Asp Glu Leu Ala Met
 420 425 430

Gln Leu Thr Lys Leu Asn Asp Ala Met Ser Lys Leu Lys Glu Ala Lys
 435 440 445

Ala Lys Leu Val Pro Glu Val Lys Pro Gln Pro Glu Asn Pro Glu Pro
 450 455 460

Lys	Pro	Gln	Pro	Glu	Gly	Glu	Lys	Pro	Ser	Val	Pro	Asp	Ile	Asn	Gln
465					470					475					480
Glu	Lys	Glu	Lys	Ala	Lys	Leu	Ala	Ile	Ala	Thr	Tyr	Met	Ser	Lys	Ile
				485					490						495
Leu	Asp	Asp	Ile	Lys	Lys	His	His	Leu	Lys	Lys	Glu	Lys	His	His	Gln
			500					505						510	
Ile	Val	Ala	Leu	Ile	Lys	Asp	Leu	Asp	Lys	Leu	Arg	Lys	Gln	Ala	Leu
		515					520					525			
Ser	Glu	Ile	Asp	Asn	Val	Asn	Thr	Lys	Val	Glu	Ile	Glu	Asn	Thr	Val
	530					535					540				
His	Lys	Val	Phe	Ala	Asp	Met	Asp	Thr	Val	Val	Thr	Lys	Phe	Gln	Lys
545					550					555					560
Gly	Leu	Ile	Gln	Asn	Thr	Pro	Gln	Val	Pro	Glu	Ala	Gln	Arg	Ala	Gln
			565					570							575
Arg	Tyr	Gln	Arg	Phe	Gln	Ile	His	Gln	Lys	Ala	Pro	Asp	Thr	Pro	Gln
			580					585						590	
Val	Pro	Glu	Ala	Pro	Lys	Ser	Pro	Glu	Val	Pro	Lys	Val	Pro	Glu	Ala
		595					600					605			
Pro	Lys	Ala	Pro	Asp	Thr	Pro	Gln	Val	Pro	Glu	Ala	Pro	Lys	Ser	Pro
	610					615					620				
Glu	Val	Pro	Lys	Val	Ser	Asp	Thr	Pro	Lys	Ala	Pro	Asp	Thr	Pro	Gln
625					630					635					640
Val	Pro	Glu	Ala	Pro	Lys	Ser	Pro	Glu	Val	Pro	Lys	Val	Pro	Glu	Ala
			645					650						655	
Pro	Lys	Ala	Pro	Asp	Thr	Pro	Gln	Val	Pro	Glu	Ala	Pro	Lys	Ser	Pro
		660						665						670	
Glu	Val	Pro	Lys	Val	Pro	Asp	Thr	Pro	Lys	Ala	Pro	Asp	Thr	Pro	Gln
		675					680					685			
Val	Pro	Glu	Ala	Pro	Lys	Ala	Pro	Asp	Thr	Pro	Gln	Ile	Pro	Glu	Ala
		690				695					700				
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<212> DNA
<213> Streptococcus pneumoniae

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<212> DNA

<213> *Streptococcus pneumoniae*

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<211> 2773

<212> DNA

<213> *Streptococcus pneumoniae*

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<211> 2489

<212> DNA

<213> *Streptococcus pneumoniae*

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<213> Streptococcus pneumoniae

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<211> 1766

<212> DNA

<213> Streptococcus pneumoniae

<400> 74

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<212> DNA

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